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THE UNIVERSITY OF ALBERTA

THE ROLE OF INDUSTRIAL ARTS IN SECONDARY SCHOOLS

by

© STEVEN BUSHROD

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

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THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "The role of industrial arts in secondary schools" submitted by S. Bushrod in partial fulfilment of the requirements for the degree of Master of Education.

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Supervisor

Date May 6, 1974

Abstract

The purpose of this study was to identify Industrial Arts education's role as a vehicle for the transmission of cultural content in relation to society's changing demands.

A review of the literature established various current trends and concerns of authors in Industrial Arts and related fields. From this review 31 statements were identified and organized into a research instrument and presented to four groups, using the Delphi technique.

This research instrument was structured so that participants could record the Probable Date of Occurrence for the first 30 statements, as well as the Desirability of the implementation of each of these statements. Statement 31 sought suggestions for a more meaningful term for Industrial Arts.

The results of the study indicated that it would be desirable that the future instructional content for Industrial Arts also place emphasis on the study of the social and cultural aspects of technology and its total effects on man.

Industrial Arts is seen by the four groups that participated in the study generally to be of much more significance in future school curricula; it is also seen to perform an integrative curricular role in promoting intelligent citizenship in a post-industrial age.

There will be a trend away from the past heavy emphasis placed on the project as a teaching vehicle by Industrial Arts teachers.

Industrial Arts teaching in the future will attempt to shift away from its current small group format and attempt to accommodate individual

differences.

The Industrial Arts teacher will have to draw upon the expertise of industrial personnel and the environment of technologically-based industry as both teacher and classroom.

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CHAPTER I

THE ROLE OF INDUSTRIAL ARTS IN SECONDARY SCHOOLS

Introduction

The early 1960's marked a period of educational curricular research, the focus of which was to identify sources of the curriculum. Learned opinion favored that school curricula be built on bodies of organized knowledge: "We ought to be making deliberate use of the findings and insights of every relevant scholarly discipline (Wilhelms, 1962, p. 16)." Organized knowledge transmitted by a "spiral curriculum", i.e., working from the general basis of education to more in-depth study, was seen as preparing an effective citizen (Wilhelms, 1962, pp. 14-25). This philosophy began a trend for "innovations" in school systems, predominantly to equip the student with varied, relevant facts selected from each discipline.

Educational critics, such as Goodlad, in the late 1960's foresaw the mismatch between educational aims and cultural needs. Goodlad urged a further look ahead in curriculum development:

> . . . Get into the curriculum the problems likely to be facing young adults in 1980. These persons currently are in the primary years of schooling. If we begin now we could plan . . . (curriculum around current problems) (p. 57).

Rubin (1969) reinforced this concept by stating:

> We can no longer afford the kind of formalized education which takes the child into the future with his gaze fixed steadfastly on the past. Somehow we must convince our patrons that it is more important to help the child think about the next civilization than to require him to remember the facts of the last one (p. 24).

Historical evidence shows that traditionally education was easy to define, for it fitted people to societal needs, i.e., education was

obligated to furnish vocabularies, concepts and standard bodies of knowledge that reflected cultural content.

Yoho (1973, p. 147) graphically traces the evolutionary development of goods and services production systems in relation to educational counterparts (see Table 1).

Table 1

Evolutionary Development of Goods and Services Production Systems in Relation to Educational Counterparts

	Institutionalized System	Educational Counterpart
I.	The hunter family enterprise	Father taught son; mother taught daughter
II.	Agricultural family enterprise	Same
III.	Craft enterprise	Apprenticeship
IV.	Factory enterprise	Factory school (vestibule schools)
V.	Corporate manufacture and service business enterprise	Service apprenticeship; trade schools
VI.	Corporate complexes and service industries	(Not developed)
VII.	Automated plants component; Exchange service	(Not developed)
VIII.	Cybernated plants; Creative (knowledge based); Corporation component; Exchange services	(Not developed)

Source: Yoho, L. W. The orchestrated system focus upon industrial arts for the senior high school. ACIATE Yearbook. Bloomington: McKnight Publishing Co., 1973.

It is significant to note that categories VI to VIII are seen as highly technological institutionalized systems--with no clearly evident educational counterpart.

The 1970's began by developments in curricular patterns, cognizance being strongly given to the weakness of our schools to adequately and effectively transfer the content of our (highly technological) culture to the student--a traditional role of education. Wilhelms (1970) comments:

> Along with its wonderful productivity, our technology has generated side effects that suddenly converge upon us with bewildering speed: pollution, contamination of the earth and sea and air, urban rot, the depletion of key resources, and simultaneously the prospect of annihilation and of more people than the world can hold--to mention but a few (p. 368).

The Alberta Commission on Educational Planning (CEP) (Worth, 1972, p. 16) recognized that technology is a major agent of social change, but also states that technological remedies are not adequate treatment for technologically created problems (Worth, 1972, p. 33). Many years of dialogue have concerned themselves with pertinent issues concerning the direction that might be taken to resolve at least some of the problems posed by our technological culture. The CEP report, among others, stresses the awareness that technological achievements impinge on moral commitments, indeed, the two are linked in reciprocity (Worth, 1972, p. 6). Hurd (1972), a science educator from Stanford University, recently said that one of the most important issues we need to consider is how to bridge the various gaps that exist between ". . . society, technology, and the school curriculum. We must do this at the very time society is undergoing extensive cultural transformations and much soul-searching in an effort to find itself (p. 1)."

This study concerns itself with the identification of the priorities within industrial arts in future curricula.

Statement of Problem

The purpose of this study is to identify Industrial Arts education's role as a vehicle for the transmission of cultural content in relation to society's changing demands.

Rationale for the Study

The CEP (Worth, 1972, p. 37) states that future educational perspectives generally must involve every aspect of the educational system, particularly the curriculum, so that the dominant characteristic of our educational system must become the ability to impart a capacity for the acceptance of and ability to deal with change, to the avoidance of future shock as related by Toffler (1970).

> . . . for the first time in history our society has the awareness and the technological means needed to control change and to choose our destiny. But we do need to act on this potential--and to act quickly. Not to do so would be to forfeit our key to a better life in the years ahead.
>
> One place to begin is with our educational system. Its efforts must be more clearly defined and its resources concentrated at the points of greatest effect. Recognition of this need should impel us toward a different conception or vision of education. This vision must both reflect and contribute to a larger vision of the quality of life itself (Worth, 1972, p. 36).

An historical study could amply reveal gradual and continual change in cultural patterns. School curriculum must likewise change. However, it is increasingly being recognized that we cannot interpret advancing technology without recognizing its effect upon human values, individual growth and development (Wolfe, 1973).

> . . . a "now" and "future" oriented [industrial arts] program . . . should enable the individual to anticipate certain kinds of changes in society and to have in some degree studied or evaluated some of the alternatives in the changing world (Maley, 1973, p. 261).

Procedure of the Study

This study was conducted in terms of library research of (current) authors in the Industrial Arts and related fields.

Findings were noted and were presented to four groups:

1. Department of Education officials, Alberta Industrial Arts, by personal interview/extrapolation, using Delphi statements (see Appendix V, pp. 120-126).
2. Faculty of Education (Industrial Arts), University of Alberta, by use of the Delphi technique (see Appendix V, pp. 120-126); total population.
3. Alberta Industrial Arts teachers, by use of the Delphi technique (see Appendix V, pp. 120-126); random sample of thirty (30).
4. Third and fourth year students (Industrial Arts), University of Alberta, by use of the Delphi technique (see Appendix V, pp. 120-126); ready-made random sample of thirty (30).

The significant trends identified through a review of the literature were itemized and presented to the groups, using the Delphi technique. The instrument was structured to permit identification of positive and negative curriculum trends, as well as the probable dates and desirability of implementation of those trends.

The Delphi Technique

Introduction. The Delphi technique is an intuitive methodology for organizing and sharing the forecasts of experts about the future by means of a series of questionnaires, as an alternative to a round-table discussion. The aim of the Delphi technique is to form a consensus of

opinion on given topics.

The basic features of the Delphi technique are (1) anonymity of the panelists, (2) controlled feedback to the panelists of opinions generated in the rounds of mailed interaction, and (3) statistically descriptive group responses. Thus, this approach eliminated committee activity, specious persuasion and the bandwagon effect of majority opinion.

Procedure of the Delphi

In this study panelists from four categories consented to participate (p. 5).

Thirty teachers of Industrial Arts were randomly sampled. The respective Superintendents of Schools were informed of the study, and they gave their permission for the researcher to correspond with the teachers in their jurisdictions (Appendix I, p. 92). Permission to involve the other groups was received orally.

Development of the Instrument. The Delphi instrument was presented to the groups as indicated on page 5. It was comprised of three parts.

Part I contained a series of topical and related statements compiled by the researcher from recent literature (Appendix V, pp. 113-118). This document assisted the subjects in their orientation to Part II.

Part II of the instrument (Appendix V, pp. 119-126) contained question statements related to the problem statement of this thesis, i.e., "To identify Industrial Arts education's role as a vehicle for the transmission of cultural content in relation to society's changing

demands (p. 4)." The subjects were asked to determine the probable time of occurrence of the question statements, and the desirability of their occurrence.

Parts I and II (Appendix V, pp. 111-126) of the Delphi were distributed to groups 2, 3 and 4 as indicated on page 5, simultaneously. Recipients were informed that they could keep Part I, and were asked to return Part II after completion.

The frequency of the responses of Part II were summarized.

A third round (Part III) of the questionnaire was anticipated, so that where the responses of Part II were seen by the researcher to be inadequate as compiled (e.g., bipolar in opinion), or where more information regarding responses was required, these statements were re-presented to the groups.

The members of group 1 (p. 5) were interviewed independently.

Data Analysis. The data collected in Parts II and III of the Delphi were summarized graphically as the proportional frequency of return in each cell, expressed as a percentage. The convergence of responses toward consensus gained in Part III was also shown (Appendix VII, p. 146; VIII, p. 159; IX, p. 172).

Summaries of the findings generally were included for each group, in descending degree of consensus, for both the Time and Desirability of Occurrence of each item.

Scenarios of each group were included so that points of convergence and divergence could be described.

The instrument was administered twice to group 4, so that a report on the reliability of the instrument, and of the study, could be ascertained.

Limitations of the Study

In the identification of the role of Industrial Arts education, sources from the United States of America were used, not to instill bias, but because of the proliferation of material available.

Industrial Arts education's role as a vehicle for the transmission of cultural content was considered as the interplay between (a) man (the student), (b) culture, (c) technology (Hurd, 1972, p. 1).

Summary

Throughout history technology has been an influence on culture--indeed, it was used to transmit culture. In the 1960's, concepts of educational curricula generally pointed to the acquisition of facts as an objective. In the early 1970's it was found that education was mismatched in relating the predominantly technological culture to the student, i.e., educational aims and needs were found to be inconsistent.

This study attempted to delineate contemporary thoughts in the field of what Industrial Arts should become, so that Industrial Arts may better serve students to cope with ensuing cultural changes.

The Delphi technique was used to present significant current trend findings to four groups for their reactions.

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CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The first part of this chapter reviews the change of philosophies of curriculum builders generally between the 1960's and the 1970's. The views of sociologists, futurologists and educators are documented regarding the effects of increasing technology in the Western world.

General Review of Related Literature

Curriculum decision makers in the early decade of the sixties placed emphasis on the transferral of subject matter as the aim of education in all disciplines:

> It is the discipline behind the subject matter that contains whatever life there is (Foshay, 1962, p. 10).
>
> The arch that bridges the gap between the learner and the discipline is the growing idea of bringing the child, from the beginning, right 'into the discipline' (Wilhelms, 1962, p. 29).
>
> Learning should be designed to produce general understanding of the structure of subject-matter (Bruner, 1960, p. 6).

The above quotations convey the topical concern of that period, and there is ample evidence to show that there was pronounced activity in curricular change. It was during the early sixties that an abundance of research into curricula generally also produced innovative programs in Industrial Arts, e.g., The Alberta Plan, the Georgia Plan for Industrial Arts, Industrial Arts Curriculum Project. The preparation, development, testing and revision of various programs, as well as vigorous professional interaction, proved to be a stabling influence .

in Industrial Arts, e.g., the Alberta Plan. The preparation, development, testing and revision of various programs, as well as vigorous professional interaction, proved to be a stabling influence on Industrial Arts. Loepp (1972) said: "These efforts have generated a great deal of momentum and have made industrial arts a more viable discipline (p. 175)."

As the decade of the sixties terminated, new basic facts of our culture were ascertained: "drastic change, unprecedented uncertainty, staggering personal and social pressures (Fijurski, 1972, p. 177).

Curriculum builders were aware by the late 1960's that the aim of the creation of a 'well-rounded' individual by the method of student absorption of subject matter in the various disciplines was mismatched. Foshay (1962), Wilhelms (1962) and Bruner (1960) by the early seventies had considerably redesigned their philosophies:

> To the degree that we allow the school curriculum to be dominated by the disciplines proposal, we fail to offer the opportunity to become more than superficially acquainted with great public problems (Foshay, 1970, p. 351).

> The fundamental mistake we make over and over is to start with the subject matter of the disciplines (Wilhelms, 1970, p. 370).

> Let students prepare plans of action, whether they be on issues in the school, on the local scene, or whatever. What is important is to learn to bring all one's resources to bear on something that matters to you now . . . I would be satisfied to declare something of a moratorium on the structure of knowledge and deal with it in the context of the problems that face us (Bruner, 1971).

D. N. Michael (1965) in The next generation projects cultural changes over the next twenty years that will directly or indirectly affect schools and teachers. He speaks of the drastic increase in the population, the advancement of cybernation, an increase in leisure time, an unprecedented advancement of technologies, and a growing demand for the

fuller recognition of human dignity. Not all, but many of the cultural forecasts of which Michael speaks are already in evidence. Undoubtedly, the educational requirements of our schools must also change. Fijurski (1972) stated: "The need will be for thinking, reasoning individuals who understand, appreciate, and participate in their culture (p. 177)."

Michael (1965) and Toffler (1971) accentuate the increasingly technological involvement of the Western world. The Worth Report (CEP, 1971, pp. 28-34) underscores the fact that even predominantly agricultural regions such as Alberta are faced with the choice of having a "second-phase industrial society" or a "person-centred society" (p. 28). The nature of the foregoing is highly technological:

> We are rapidly approaching a point of critical choice in our movement toward the person-centred society or the second-phase industrial society. This choice, when finally made, will not necessarily be the result of a major decision by any one agency or group in society. Rather, it will grow from a number of decisions made more or less simultaneously by different societal elements. In fact, through a multiplicity of decisions now being made by various groups in society, our future is being decided. But it is now essentially an unconscious choice, a blind, incoherent, sometimes capricious choice. And that is suicidal (CEP, p. 29).

Ziel (1973) recognizes the critical value changes and decisions of immediate concern that need societal attention:

> What will happen to the occupational structure and to the ordering of scientific and technological priorities when "human" or "social" growth replaces "material" growth as an economic objective? What will happen to economic priorities as we develop a global rather than local perspective? Finally, how will the training provided by universities be affected by these changed economic priorities and social perspectives? (p. 4)

The premise for curricular change at this time, therefore, is to gear the curriculum to the needs and lives of the students, to those

for whom the curriculum exists. It may be seen that contemporary philosophies of education no longer incorporate factual learning per se in each discipline, but regard future education to be an 'education for change', with 'the student' as the focal point: "Obviously, we don't know what life will be like in 2000 A.D. except that it will be characterized by even more rapid changes than we have today (Toffler, 1970, p. 3)." Therefore, it would seem that we should teach our students to "learn how to learn" so that they would continue to learn long after their formal education is completed.

> We need to develop people rather than things. We need to prepare young minds for the understanding, acceptance, and control of new things as they are developed. We must teach the "why" of things rather than only the "how" (Berger, 1972, p. 182).

Industrial arts is seen by many educators to be perhaps the most effective discipline through which the student may be oriented in his technological culture:

> Although not everyone will become a technologist or engineer, everyone will live in a world where engineering and technology continue to change his way of life. Happily, no subject area in the public schools is in a better position to prepare our future citizens for the task of understanding their technological society than industrial arts (Berger, 1972, p. 184).

Olson (1972) further delineates the role of the school, and the role of industrial arts within the school, placing emphasis on the fact that the student in our schools is of primary concern:

> In any culture, the primary function of the school is to acquaint the young with the nature of that culture. In primitive form, this assures survival of that culture. In an advanced society, it orients the young to the ways of that society, acquainting it with the nature of the medium in which it lives. That medium for today's youth is a culture which is characteristi-

> cally and intensely technological. The American school, then, has as its primary responsibility to acquaint the young with the nature of that type of culture. In so doing, it acquaints them with the technology itself.
>
> For the individual, an understanding of self is necessary to an understanding of the culture. This suggests that it is the responsibility of the school, and its continuing commitment, to assist the individual in the discovery, development, release, and realization of his own talent potential. In accepting this commitment, the school calls on industrial arts to assist the individual in the process of self-realization within the context of technology (p. 34).

The changing role of industrial arts is evident, cf. Frederick Bonsor's (1942) definition, "a study of the changes made by man in the forms of materials to increase their values and of the problems of life related to these changes (p. 3)."

Kagy (1972) quotes a definition which specifically relates to the philosophy of industrial arts in the period of the early 1960's:

> Industrial arts is a subject area defined as dealing with the understanding and interpretation of industrial activity. The student of industrial arts not only seeks knowledge of the industrial society in which he lives but he learns how to use tools, work with materials, and perform basic processes (p. 41).

Further, he states that this definition is one that "we have accepted in the profession as to what industrial arts is all about (1972, p. 41)."

The scope of industrial arts has broadened from a consideration of the materials, tools and processes of industry to the relationship of man in his culture. Lemons (1970) says: "Industrial Arts, then, is concerned with the study of man, technology and society (p. 31)." Olson (1972) offers a similar definition. He states that industrial arts is "the interrelations of man, technology, and culture, with emphasis on the impact and consequences of technological advance(p. 36)."

Summary

Changes in the philosophies of educationalists in general have led to more emphasis on 'human' and 'social' growth in education. These concepts have also affected Industrial Arts. Concurrently, the effects of the increasing technology in our Western culture has changed Industrial Arts in both definition and content.

Influences on Curricula

More specific views of primarily Industrial Arts educators are cited regarding the current influences, re-definition and the content change within Industrial Arts.

During the past years, industrial arts has held industrial technology as its discipline base. Technology, however, is not static but is undergoing rapid change. Drucker (1968) says that:

> . . . not only are specific technologies advancing within themselves, but new ones are upon us and are certain to create new major industries and brand-new businesses while rendering obsolete some of these that exist now (p. 24).

On this fact alone it may be stated that curriculum must also change.

Loepp (1972) states that some industrial arts programs are reflecting this change:

> To keep pace with technological change, a number of industrial arts educators have established avenues of communication with personnel in industry. Through this kind of interaction, they have found it possible to identify elements of industrial technology that are relevant and important. We should continue to solicit and receive input from industrial sources (p. 175).

Another fact identified by Loepp relative to industrial arts curricula is that: ". . . our content is steadily being translated into principles and concepts, and in a rapidly changing society, this trend

appears to have merit (1972, p. 175)."

The justification for this trend is exemplified by Robert Hutchins in The learning society. He says we need to teach "general principles which can be applied in a wide variety of situations. Such principles, if sound, are not made obsolete by the passage of time or by changing conditions; an intelligent human being can apply them to such conditions as arise (1968, p. 52)."

A third factor influencing industrial arts curriculum was stated by Kabakjian (1970) who said: "The content of industrial arts is the study of the reciprocal relationship between man and technology (p. 9)."

Anderson (1970) states that another influence on curricula is the emphasis on guidance in the areas of prevocational and preoccupational education. He says that industrial arts should offer distinct opportunities for each student to acquire education, social and occupational information, and to engage in activities that assist in choosing and planning a career (p. 45). Todd (1972) illustrates how this may be achieved using models and role playing to acquaint students with the world of work (pp. 132-136). Waetjen (1973) also has developed a very similar concept, based on the philosophy of increasing occupational change (pp. 165-167).

Loepp (1972) identifies these trends as being "important for the future in the areas of curriculum and its development [in industrial arts] (p. 175)." The isolation of these trends serves to typify current general philosophies. Lemons (1972) offers a sampling of sixteen topics discussed by the Man-Society-Technology Forum for the improvement of Industrial Arts Education (AIAA, 1972, p. 400).

- Provide for the exposure of technology to pre-school children and continually throughout life.
- Develop within the pupil a positive attitude toward change and an acceptance of it.
- Energy sources and uses are not infinite, and technology can create an unreal or false sense of security.
- The use of educational facilities must and can be used more effectively.
- Pupils must understand economics of our society.
- What values and ethical goals could form the common denominator of a technological society to provide all people with a quality life?
- Schools should develop curricula that place more emphasis on "doing" rather than abstraction.
- Colleges must break the "for young people only" syndrome and become centers of continuing education for people throughout their lives.
- A study of technology must include not only the technical dimensions of technology but also the role of man and his relationship to a highly technological society.
- There is a crying need to eliminate waste and to use by-products more effectively.
- Should we think in terms of large content areas with a more comprehensive education rather than specialized content?
- Education must cause young people to develop the ability to make intelligent judgements concerning material things.
- Schools should prepare every child for leisure as well as for occupational competency.
- Educational technology including multi-media and multi-activity instruction must be used more effectively.
- Industrial arts, like many areas of education, has taught courses in isolation from the public and even from other educators and disciplines.

- Place less emphasis on the subject name and image and greater emphasis upon the results desired from the program (p. 8).

Kagy (1972) is recognizant of the pressures that influence the curriculum, and of contemporary thoughts on curricular inclusions. He states: "We have a tendency to wonder which direction we should go. What should our priorities be? (p. 45)" Fischler (1972) also queries curricular direction in industrial arts: "The challenge, then, . . . is to ask the question, 'Where should industrial arts be going, and how do we get there (p. 13)."

The question raised above is difficult to answer, for Kagy (1972) and Kranzberg (1972, 1973) both testify that there are as many philosophies of industrial arts curricula as there are innovative programs. Brown (1972) says: "So we in professional industrial arts teacher education have devised several 'plans' for making our instruction more substantive (p. 51)." Gelina (1972) states that the reason for the varied present-day innovative programs encompassed under the name industrial arts is the problem of definition:

> The major difficulty has been in the adoption and operation of a true definition of industrial arts by the people in the field. If we had the consensus of a mere 50% on a single definition, it would come as a major breakthrough . . . One need only to compare the definitions of [various innovative industrial arts programs] to realize that it is a difficult task to define industrial arts (p. 129).

Nelson (1972) further states: "Thus, while each of these different schools of thought has evolved its own concept . . . the dilemma of discerning a specific content for industrial arts has become more apparent (p. 144)."

A summary of the current innovative programs in Industrial Arts in North America as identified by Kufahl and Wright (1971) and their method of compilation is included (Appendix IV, pp. 98-110).

Summary

The curricular focus in educational content generally has changed during the decade of the sixties from the transferral of subject matter in each discipline to curricular content that has relevance to students. Curriculum developers have recognized the need to educate students so that they may cope efficiently with cultural changes.

Industrial Arts is seen to be perhaps the most effective discipline through which a student may be oriented in our technological culture.

Although various philosophies of Industrial Arts curriculum content abound, the priorities within Industrial Arts curricula are not common to all programs. Indeed, there seem to be as many philosophies of Industrial Arts curricula as there are programs (Kufahl & Wright, 1971; see Appendix IV, pp. 98-110).

Some of the problems relating to curricular content are seen to be the inability of curriculum leaders in Industrial Arts to agree on a mutually acceptable definition for the term Industrial Arts and the dilemma of discerning specific content has become more apparent.

Review of Previous Delphi Studies

The second part of this chapter deals with the development of the Delphi technique, and educational studies that have used the Delphi methodology have been reviewed. The name Delphi refers to Apollo's oracle in Delphi, Greece. According to Greek mythology, the oracles were responsible for predicting the future.

A review of the library indexes directed towards educational research indicated that although many studies have been completed that use Delphi technique in determining the future of education, none of these studies dealt specifically with Industrial Arts.

The study of futurology led to the development of the Delphi technique by the Rand Corporation during the early 1950's for the United States Department of Defense. At that time, the Government of the United States classified this methodology under its rubric of 'secret'. For a number of years, this technique and its methodology were not available to the public.

When the secrecy wraps were lifted, Rand issued a number of reports on the Delphi technique and its validity and reliability under different situations. Two former members associated with Rand who have written considerably on the Delphi technique are Dalkey and Helmer. In 1969 Dalkey wrote a definitive book, The Delphi method: An experimental study of group opinion, which fully describes this research method.

A review of this text in detail showed that both reliability and validity of the technique were greatly increased by the use of high-calibre experts in their respective fields of research.

If indeed such experts were available, it was found that the use of

fourteen experts in any given field would produce optimum results. Dalkey found that the use of more than fourteen experts generally led to replication of answers. However, where the expertise of these respondents was under question, or where circumstances permitted, the use of a greater number of panelists was acceptable.

The Delphi technique is a methodology for organizing the opinions of experts about the future. Its original use was to establish a chronology of scientific and technological events and to judge when the events might occur through the speculations of several experts. The traditional approach to predicting the future was to seek a consensus among experts through open discussion or conference. However, joint committee activity often introduces undesirable psychological factors, "such as specious persuasion, unwillingness to abandon publicly expressed opinions, and the bandwagon effect of majority opinion (Dalkey & Helmer, 1963)."

The Delphi technique makes it possible to establish convergence by avoiding some of the difficulties identified by Dalkey and Helmer because the experts involved exchange their opinions anonymously through an intermediary. Hostrop (1973) says that this method of planning "is based on the premise that it is possible to influence the direction of future trends by proper planning, based on informed, intuitive judgments (p. 77)."

Weaver (1971) says that:

> Delphi has been justified primarily on the grounds that it prevents professional status and high positions from forcing judgements in certain directions as frequently occurs when panels of experts meet. The intention was to assure that changes in estimates reflected rational judgement, not the influence of certain opinion leaders (p. 267).

A Typical Delphi Study

For the sake of clarity, an account of a typical Delphi study has been included below (Gordon & Ament, 1969):

> In a typical Delphi investigation, the participants are sent a series of questionnaires through the mail. In the first, they might be asked to provide their judgement as to likely dates or occurrence of a group or events and developments. The collated responses normally reveal a spread of opinions; these data are presented to the respondents in the second questionnaire. In this round, the respondents are given the opportunity to revise their estimates in light of the group response, and those participants whose estimates have fallen earlier or later than those of the majority are asked to provide reasons for their position. These reasons, along with the new estimates for the group as a whole, are collated and fed back to the respondents on the third questionnaire, and they are again asked to reassess their earlier estimates in view of the new group response and reasons provided for early and late dates.
>
> A convergence or opinion has been observed in a majority of cases where the Delphi approach has been used. In the few instances in which no convergence toward a relatively narrow interval could be obtained, opinions generally polarized, so that independent schools of thought regarding a particular issue could be discerned (pp. 2-3).

Educational Studies Involving the Delphi Technique

Although library research failed to identify Delphi studies concerned with Industrial Arts curricula specifically, other educational studies involving the use of the Delphi technique follow.

One of the earliest pilot Delphi studies in educational thinking was conducted by Helmer (1965). In these studies Helmer elicited preference judgements from a panel of educational experts in various fields related to education at the Educational Innovations Seminar, UCLA,

1965. The purpose was to compile a list of preferred goals of education for possible federal funding.

Cyphert and Gant (1970) in the Journal of Teacher Education (1970) describe the use of the Delphi technique to elicit preferences from the faculty of a School of Education regarding priorities in teacher education at that particular institution.

Weaver (1971) discussed the two aforementioned researches, saying of them that, "most of the change in priorities occurred after the first modal distribution was reported back to all respondents. Subsequent rounds failed to produce significant changes (p. 268)." Weaver (1971) also comments that, "respondents were asked to focus on what they would like to see happen, rather than what is likely to happen. However, it is unclear how that difference in focus would change the outcome of either type of experiment (p. 268)."

A Delphi study was conducted by Ziegler at a national conference of professors in 1969. The major purpose was to collect opinions about prospective educational developments which might have an impact on educational administration, their probable dates of occurrence, the desirability of such developments should they occur, and their potential interventions.

Gordon and Ament (1969) conducted research into technological and scientific development and their societal consequences. In part this also involved education. In that study the first questionnaire

presented a list of 40 technological developments selected by the researchers and asked that an indication be given of the possibility (19%, 50%, 90%) of the occurrence of the statements. In further questionnaires opinions regarding the possible dates of the implementation of those statements, the desirability of them, and their possible implications were ascertained. Respondents were also asked to record their familiarity with the subject areas covered by the statements. Gordon and Ament (1969) comment that: "As in all Delphi studies, the value of the results depends largely on the excellence [of the experts] (p. 4)", i.e., respondents were chosen who had knowledge, in varying degrees, of 25 differing disciplines ranging from aerospace technology to transportation.

Hostrop (1973) cites another 1969 Delphi study in which statements were derived from 1,000 residents living potentially in the area of a new university (pp. 76-86). Hostrop (1973) says: "Delphi provides a means whereby a spanking new institution can ascertain its course of direction in its early planning stages so as to be in consonance with the community it is to serve." In order to do so, a first questionnaire was sent to residents in the area of the proposed university site which called for a brief list of what are considered to be major goals of the institution. A second mailing furnished respondents with a collated list of responses and asked them to rate each item by its importance and probability of success. Later, a third and final mailing reported on the consensus of opinion on the items rated. Respondents were then asked to either revise their opinions or to specify reasons for remaining outside the consensus.

Clarke and Coutts (1971) used the Delphi technique to conduct a study on the future of teacher education in the Province of Alberta. Forty experts in the field of education were provided with 20 statements about the future of education (Part 1). Further edited statements became the questionnaire, on which panelists were asked to choose the most probable date of occurrence of those statements. The collated responses were sent to the respondents who were asked to reconsider particular items on the basis of that new information, so that consensus could be attained. In a further mailing, participants were asked to state the most probable date of occurrence of the statements in their own institutions.

Summary

A brief history of the Delphi technique and a typical general methodology in using this technique were given.

Examples of educational researches involving the use of the Delphi technique together with their brief methodologies, where available, were cited.

The next chapter deals with the methodology of this study.

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CHAPTER III

METHODOLOGY

Introduction

The review of the literature (pp. 10-26) focused on the various current Industrial Arts philosophies as expressed by authorities in the field of Industrial Arts. This chapter deals with the development of the instrument, the pilot study, the reliability figures and methodology of the Delphi technique.

Development of the Instrument

The researcher selected 41 statements of possible topical concern as identified in the literature (Appendix V, pp. 119-126) related to these philosophies and innovative programs. A panel of two experts in Industrial Arts philosophy and curricular innovations vetted these statements. During this process, statements deemed by the two experts to be of only limited concern, and statements that repeated others in the group, were discarded. Thirty of the 41 statements were retained. So that the statements took a Delphic form, the words 'will' or 'will be' were added. These 'question statements' comprised numbers 1 to 30 of Part II of the Delphi (Appendix V, pp. 119-126).

An example of the editing process follows. The original quotation for question statement 10 (Appendix IV, P. 104) reads:

> Technology is the source of subject matter. As such industrial arts deals with the human complex, the technical complex, and the cultural complex.

The finalized statement was edited to read:

> Industrial arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex (Appendix V, p. 122).

The 31 statements essentially reflected the current philosophies of curriculum builders, denoted current trends and concerns in the field of Industrial Arts. Statement 31 (Appendix V, p. 126) required a short answer and was included to gather suggestions for a more meaningful term for Industrial Arts other than 'Industrial Arts' that respondents may design (after Gelina, 1972, p. 129).

In order to determine the role of Industrial Arts, responses to the statements were collected in two categories:

(a) the Time the statements will probably occur (1970-1975, 1975-1985, 1985-2000, Never)

(b) the Desirability of the implementation of that statement (Very Desirable, Desirable, Of Little or No Importance) (Appendix V, pp. 120-126).

To orientate the thinking of the respondents to the statements of Part II (pp. 120-126),17 further topical and related statements of a general futurological and educational nature were compiled by the researcher (Appendix, pp. 113-117). These statements were also vetted by an expert in the Delphi method. The statements of Part I did not require any written response.

Pilot Study

Third and fourth year students (Industrial Arts), University of Alberta, were subjects in the pilot study (group 4, p. 5).

In November, 1973 the subjects of the pilot study received an undated copy of a covering letter (Appendix, p.112).

This letter stated the purpose of the study and gave a brief description of its methodology. The subjects of the study were asked in the letter to read Part I of the Delphi (Appendix V, pp. 113-117) which they could keep, and to rate the statements of Part II (Appendix V, pp. 120-126) according to their opinion of (a) the possible date of implementation of that statement in Industrial Arts curriculum (50% probability) and (b) the desirability of occurrence of that statement (50% probability).

Part II of the study was collected from the subjects after approximately fifteen minutes.

Two months later, in early January, 1974, the exact procedure as reported above was repeated, using the same subjects. Thus, the data from the first administration of the instrument could be correlated with the data of the second administration to determine the reliability of the instrument. Thirty subjects completed Part II (Appendix V, pp. 120-126) in both November, 1973 and January, 1974.

Reliability of the Instrument

The reliability of the instrument was determined by forming two independent matrices for each statement, one in which to collate the responses regarding the probable time of implementation of that statement, the other to collate the responses regarding the desirability of the implementation of that statement. Perfect reliability (1.00) would require all pairs of responses to be registered in the shaded areas as shown in Figures 1 and 2 (p. 32).

Coefficients of reliability were formulated by the following formula:

Time 1 \ Time 2	1970-1975	1975-1985	1985-2000	Never
1970-1975				
1975-1980				
1985-2000				
Never				

Fig. 1. Matrix to determine coefficients of reliability: time

Time 1 \ Time 2	Very Desirable	Desirable	Of Little or No Importance
Very Desirable			
Desirable			
Of Little or No Importance			

Fig. 2. Matrix to determine coefficients of reliability: desirability

$$\text{reliability} = \frac{\text{no. of pairs in the diagonal}}{\text{total no. of respondents}}$$

These coefficients of reliability were averaged to produce a composite reliability for both the probable dates of implementation of the statements and the desirability of the implementation of the statements (p. 34).

Instrument Distribution

The Delphi instruments Parts I and II were given to four population groups (see p. 5) in January, 1974 for their reaction (see Appendix V, pp. 111-126).

Group 1 (Department of Education officials) were interviewed personally. The statements of Part II were used as the basis of the interview. Part II of the instrument (pp. 120-126) was completed as the interview progressed.

Group 2. Faculty of Education, Industrial Arts.

Group 3. Alberta Industrial Arts teachers. A random sample of 30 teachers was selected from the population of Industrial Arts teachers.

Group 4. Third and fourth year students, Industrial Arts. The first round of responses collected in the pilot study (p. 30) was used.

The responses of Part II were indicated as a percentage in each cell for both categories and for each group (Appendix VI-IX, pp. 127-172). The numbers of nil-respondents are included.

Criteria for Statement Re-distribution

The criteria for return of the statements of Part II in Part III for further clarification were as follows. Regarding the date of probable

Table 2

Coefficients of Reliability:
Time and Desirability

Question No.	Date of Occurrence Coefficients	Desirability of Occurrence Coefficients
1	.6	.5
2	.7	.7
3	.6	.7
4	.6	.9
5	.3	.8
6	.6	.7
7	.4	.6
8	.8	.6
9	.5	.5
10	.8	.6
11	.6	.7
12	.6	.6
13	.6	.9
14	.6	.9
15	.4	.7
16	.7	.7
17	.4	.7
18	.5	.7
19	.8	.5
20	.5	.9
21	.7	.7
22	.8	.8
23	.4	.5
24	.7	.7
25	.7	.9
26	.6	1.0
27	.8	.7
28	.6	.4
29	.8	.8
30	.8	.9
Total	18.5	21.3

Composite reliability (Time) = 18.5/30 = .62

Composite reliability (Desirability) = 21.3/30 = .71

occurrence of the statement: (a) more than 25% return in three or more adjacent categories or (b) more than 30% return in two non-adjacent time categories.

Regarding the desirability of implementation: (a) more than 60% return in one cell was needed.

The statements of Part II which fell into the above categories were returned. Respondents, as well as being given the collated responses, were asked to re-indicate either an assertion of their former choice or a change of opinion regarding the re-presented statements (Appendix III, p. 90).

The convergence of Part III relative to Part II for both Time and Desirability for groups 2, 3 and 4 is shown (Appendix, pp. 146, 159, 172).

The categories of convergence of respondents' opinions were defined thus:

Extremely High Degree of Consensus	90%+
Very High Degree of Consensus	80-89
High Degree of Consensus	70-79
Considerable Degree of Consensus	60-69
Some Degree of Consensus	50-59
Little Degree of Consensus	40-49
No Degree of Consensus	-40

Summary

Thirty of the 41 statements were chosen from the philosophies of current authors in Industrial Arts and related fields. These statements formed Part II of the Delphi instrument. The statements were structured so that responses regarding the time of probable implementation of the statement and the desirability of implementation of the statements

could be ascertained.

A pilot study to determine the feasibility and reliability of the instrument was conducted.

Subsequently, the instrument was presented to four groups in successive parts and the categories of the responses of each group were defined.

Chapter IV contains summaries of the opinions expressed by the groups in descending order of consensus, for both the Probable Date of Occurrence and the Desirability of Occurrence of the statements.

CHAPTER IV

ANALYSIS OF THE DATA

Introduction

In order to determine 'The Role of Industrial Arts in Secondary Schools', 31 statements of curriculum builders reflecting current trends and concerns in the field of Industrial Arts curricula were developed into Delphic form. For the purposes of this study, responses were collected in two categories: (a) the Probable Date that the statements will come true and (b) the Desirability of the implementation of that statement.

Table 3 contains a review of the four groups involved in the study and the number of participants in each group.

Table 3

Groups and Participants in the Delphi Study

Group	Contacted	Participated	
		Round 1 (Part 2)	Round 2 (Part 3)
1. Department of Education Officials	2	2 (by interview)	
2. Faculty of Education (Industrial Arts, University of Alberta)	11	9	9
3. Alberta Industrial Arts Teachers	30	30	30*
4. Third and Fourth Year Students (Industrial Arts, University of Alberta)	30	30	30

*Three second round responses were received orally.

This chapter contains the opinions of these four groups regarding the Probable Date of Occurrence and the Desirability of Occurrence of the statements.

The responses of Group 1 did not lend themselves to the classifications as delineated on page 35, for each of the two respondents represent 50 percent of the group. Therefore, only those statements about which there had been consensus (i.e., identical responses of participants have been included.

The responses of Groups 2, 3 and 4 are presented in descending order of consensus for the Probable Date of Occurrence and the Desirability of Occurrence of the statements respectively, as defined on page 35. For reading ease, each category of consensus, e.g. "High Degree of Consensus 70-79%", has been subdivided into the Time and Desirability categories respectively, as presented in Part II of the Delphi instrument (Appendix V, pp. 120-126).

Statement 31 of the Delphi instrument ('Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.) required a short response. These responses are presented at the end of the Time and Desirability analyses for each group.

Group 1: Department of Education Officials

The opinions of this group were obtained by individual interviews; Part II of the Delphi instrument was used to structure the interview. The interview method was used because of the nature of the participants' professional responsibilities, so that all comments could be recorded by the researcher while the respondents marked Part II of the Delphi instrument.

Consensus - Group 1 - Probable Date of Occurrence

The participants in Group 1 independently completed Part II of the Delphi instrument. The statements below are those about which the participants responded identically.

Consensus of opinion was obtained regarding 19 of the 30 statements (63%). Of the 19 statements, nine are seen to probably occur between 1970-75, six statements are seen to probably occur between 1975-85, and four would probably never occur.

Probable Date of Occurrence 1970-75

3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.
4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.

Probable Date of Occurrence 1970-75 (continued)

14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.
19. There will be disillusionment with innovation and change in Industrial Arts.
24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.

Probable Date of Occurrence 1975-85

5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.

Probable Date of Occurrence 1975-85 (continued)

11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.

21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.

28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.

Probable Date of Occurrence 1985-2000

None.

Probable Date of Occurrence - Never

2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.

9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.

17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.

30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.

Consensus - Group 1 - Desirability

The participants in Group 1 independently completed Part II of the Delphi instrument. The statements below are those about which the participants responded identically.

Consensus was obtained regarding 18 of the 30 statements (60%). Of the 18 statements, 15 were regarded as 'Very Desirable', one statement was regarded as 'Desirable' and two statements were 'Of Little or No Importance.'

Very Desirable

3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.
4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.

Very Desirable (continued)

16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.

18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.

21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.

22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.

24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.

25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.

26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.

28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.

Desirable

23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.

Of Little or No Importance

2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.

17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.

31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.

    1. Industrial Education
    2. Of Little or No Importance

Group 2: Faculty of Education, Industrial Arts

Consensus - Group 2 (Faculty of Education, Industrial Arts) - Probable Date of Occurrence

The responses of this group are presented in descending order of consensus. Each category of consensus, where applicable, has been subdivided into the Time structure as presented in the Delphi instrument, i.e., 1970-75, 1975-85, 1985-2000, Never.

Extremely High Degree of Consensus (90%+)

None

Very High Degree of Consensus (80-89%)

Never

2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.

High Degree of Consensus (70-79%)

1970-75

18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.
19. There will be disillusionment with innovation and change in Industrial Arts.

Never

9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.

Considerable Degree of Consensus (60-69%)

1970-75

4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.

14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.

1975-85

8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]

Never

17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.

Some Degree of Consensus (50-59%)

1970-75

20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.

24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.

26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.

Some Degree of Consensus (50-59%) (continued)

1970-75 (continued)

27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.

30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.

1975-85

3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.

5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.

12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.

22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.

23. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.

Some Degree of Consensus (50-59%) (continued)

Never

1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.

6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.

Little Degree of Consensus (40-49%)

1970-75

7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.

11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.

25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.

1975-85

15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.

16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.

Little Degree of Consensus (40-49%) (continued)

1985-2000

21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.

29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.

1985-Never (i.e., 44% response in 1985-2000 cell, 44% response in Never cell)

23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.

Never

10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.

13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.

No Degree of Consensus (-40%)

None.

Consensus - Group 2 (Faculty of Education, Industrial Arts) - Desirability

The responses of this group are presented in descending order of consensus. Each category of consensus, where applicable, has been subdivided into the Desirability structure as presented in the Delphi instrument, i.e., Very Desirable, Desirable, Of Little or No Importance.

Extremely High Degree of Consensus (90%+)

Very Desirable

22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.

Very High Degree of Consensus (80-89%)

Of Little or No Importance

2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.

High Degree of Consensus (70-79%)

Very Desirable

4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.

15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.

21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.

High Degree of Consensus (70-79%) (continued)

Desirable

8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.
24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.

Of Little or No Importance

19. There will be disillusionment with innovation and change in Industrial Arts.

Considerable Degree of Consensus (60-69%)

Very Desirable

1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.
3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.
13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.

Considerable Degree of Consensus (60-69%) (continued)

Very Desirable (continued)

16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.

26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.

27. Industrial Arts curriclum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.

28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.

Desirable

7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.

11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.

12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. ~ Industrial Arts will be of fundamental curricular importance in developing these skills.

Considerable Degree of Consensus (60-69%) (continued)

Desirable (continued)

18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.
23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.
29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological age.

Of Little or No Importance

9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.
17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.

Some Degree of Consensus (50-59%)

Desirable

14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.

Little Degree of Consensus (40-49%)

None.

No Degree of Consensus (-40%)

None.

31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.

1. Of Little or No Importance
2. Man, Society, Technology
3. The term used is unimportant, the content is important.
4. History of Industrial Arts
5. Says who?

Group 3: Alberta Industrial Arts Teachers

Consensus - Group 3 (Alberta Industrial Arts Teachers) - Probable Date of Occurrence

The responses of this group are presented in descending order of consensus. Each category of consensus, where applicable, has been subdivided into the Time Structure as presented in the Delphi instrument, i.e., 1970-75, 1975-85, 1985-2000, Never.

Extremely High Degree of Consensus (90%+)

None.

Very High Degree of Consensus (80-89%)

None.

High Degree of Consensus (70-79%)

1970-75

4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.

Considerable Degree of Consensus (60-69%)

1970-75

14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.

Considerable Degree of Consensus (60-69%) (continued)

Never

1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.
2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.

Some Degree of Consensus (50-59%)

1970-75

19. There will be disillusionment with innovation and change in Industrial Arts.
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.
27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.

Never

17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.

Little Degree of Consensus (40-49%)

1970-75

5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.

Little Degree of Consensus (40-49%) (continued)

1970-75 (continued)

7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]

12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.
13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.
18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.

Little Degree of Consensus (40-49%) (continued)

1975-85

11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.
22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.
28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.
29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.

1985-2000

10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.
21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.

Never

23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.

No Degree of Consensus (-40%)

1970-75 - 1975-85 (i.e., 33% response in 1970-75 cell; 33% response in 1975-85 cell)

9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.

1975-85

3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.
24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.

Never

30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.

Consensus - Group 3 (Alberta Industrial Arts Teachers) - Desirability

The responses of this group are presented in descending order of consensus. Each category of consensus, where applicable, has been subdivided into the Desirability structure as presented in the Delphi instrument, i.e., Very Desirable, Desirable, Of Little or No Importance.

Extremely High Degree of Consensus (90%+)

None.

Very High Degree of Consensus (80-89%)

Very Desirable

22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.

Of Little or No Importance

19. There will be disillusionment with innovation and change in Industrial Arts.

High Degree of Consensus (70-79%)

Very Desirable

4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.
12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.
13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.

High Degree of Consensus (70-79%) (continued)

Very Desirable (continued)

25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.

Desirable

30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.

Of Little or No Importance

17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.

Considerable Degree of Consensus (60-69%)

Very Desirable

3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.

Considerable Degree of Consensus (60-69%) (continued)

Very Desirable (continued)

14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.
28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.

Desirable

1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.
18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.
21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.
27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.

Considerable Degree of Consensus (60-69%) (continued)

Desirable (continued)

29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.

Of Little or No Importance

2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.

23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.

Some Degree of Consensus (50-59%)

Very Desirable

9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.

11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.

Little Degree of Consensus (40-49%)

None.

No Degree of Consensus (-40%)

None.

31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.

    1. Technology
    2. Industrial Arts
    3. Industrial Living
    4. Industrial Education (4)
    5. General Technology
    6. Industrial Technology (2)
    7. Productive Society
    8. Career Education
    9. Modern Technology
    10. Productive Society's Technology
    11. Resource Technology
    12. Industrial Exploration
    13. Technological Experience
    14. Is change in title significant?
    15. Title is already perfect. (3)

Group 4: Industrial Arts Students

Consensus - Group 4 (Industrial Arts Students) - Probable Date of Occurrence

The responses of this group are presented in descending order of consensus. Each category of consensus, where applicable, has been subdivided into the Time structure as presented in the Delphi instrument, i.e., 1970-75, 1975-85, 1985-2000, Never.

Extremely High Degree of Consensus (90%+)

1970-75

19. There will be disillusionment with innovation and change in Industrial Arts.

Very High Degree of Consensus (80-89%)

1975-85

30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.

High Degree of Consensus (70-79%)

1970-75

4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.

1975-85

24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.

Considerable Degree of Consensus (60-69%)

1970-75

20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.

1975-85

3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.
12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.

Considerable Degree of Consensus (60-69%) (continued)

1975-85 (continued)

13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.
14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.
21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.
22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.
23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.
28. Although there will be a common core of learing for all students in Industrial Arts, each student's program will be individually tailored.

Considerable Degree of Consensus (60-69%) (continued)

1975-85 (continued)

29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.

1985-2000

2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.

Never

1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.

Some Degree of Consensus (50-59%)

1975-85

10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.
18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.

Little Degree of Consensus (40-49%)

1975-85

9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.

Little Degree of Consensus (40-49%) (continued)

1975-85 (continued)

27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.

No Degree of Consensus (-40%)

1985-Never

17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base. (33% response 1985-2000, 33% response Never.)

Consensus - Group 4 (Industrial Arts Students) - Desirability

The responses of this group are presented in descending order of consensus. Each category of consensus, where applicable, has been subdivided into the Desirability structure as presented in the Delphi instrument, i.e., Very Desirable, Desirable, Of Little or No Importance.

Extremely High Degree of Consensus (90%+)

Very Desirable

13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.

Very High Degree of Consensus (80-89%)

Very Desirable

4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]
22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.
30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.

High Degree of Consensus (70-79%)

Very Desirable

3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.
17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.

High Degree of Consensus (70-79%) (continued)

Very Desirable (continued)

21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.

28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.

Desirable

16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.

24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.

Considerable Degree of Consensus (60-69%)

Very Desirable

9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.

11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.

Considerable Degree of Consensus (60-69%) (continued)

Very Desirable (continued)

12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.

18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.

27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.

29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.

Desirable

1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.

6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.

7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.

Considerable Degree of Consensus (60-69%) (continued)

Desirable (continued)

14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.

20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.

23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.

Of Little or No Importance

19. There will be disillusionment with innovation and change in Industrial Arts.

Some Degree of Consensus (50-59%)

Of Little or No Importance

2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.

Little Degree of Consensus (40-49%)

None.

No Degree of Consensus (-40%)

None.

31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.

1. Technical Education (4)
2. Social Technology (5)
3. Life
4. Technological Assessment
5. Industrial Education (2)
6. Arts and Crafts

Summary

In order to determine 'The Role of Industrial Arts in Secondary Schools', 31 statements of current trends and concerns in the field of Industrial Arts curricula were presented to four groups in Delphic form. Participants were asked to respond to the first 30 statements by indicating: (a) the Probable Date of Occurrence when the statements will come true and (b) the Desirability of the implementation of that statement. Statement 31 sought a short response, i.e., suggestions for a more meaningful term for Industrial Arts.

The data for Group 1 (Department of Education officials) were collected by interview; the data of the other three groups were collected in two successive mailed rounds of Delphi questionnaires.

The analysis of the data shows the statements of Group 1 about which the participants responded identically regarding the Probable Date of Occurrence and Desirability categories; the responses of the other three groups were presented in descending order of consensus of the statements for both the Probable Date of Occurrence and Desirability.

Some details of the data are outlined below.

The essence of the Delphi technique is to form consensus. This was achieved on all but six statements. Group 3 (Alberta Industrial Arts Teachers) did not reach consensus in the Probable Date of Occurrence category regarding statements 3, 6, 9, 24 and 30; similarly, Group 4 (Industrial Arts Students) did not reach consensus over statement 17 in the Probable Date of Occurrence category.

Each of the four groups viewed approximately one-third of the statements occurring in the 1970-75 time range. Of these, statements 4 and 26 were common to all four groups; a further three statements, 7, 14 and 25, were common to Groups 1, 2 and 3. Statement 28 was also common to the four groups in the 1975-85 time range.

Group 4 viewed 17 of the 30 statements as probably due to occur in the 1975-85 time range, all with Considerable (60-69%) consensus. The other groups forecast only approximately six statements to probably occur within that time range.

A total of five statements, 2, 10, 16, 21 and 29, were said by the four groups collectively to probably occur in the 1985-2000 time range.

Nine statements, 1, 2, 6, 9, 10, 13, 17, 23, 30, were said by the four groups collectively to probably Never occur.

Seven statements, 3, 4, 5, 15, 22, 26 and 28, were viewed by each of the four groups to be Very Desirable. Group 1 viewed 15 of the 30 statements as being Very Desirable; Group 2 (Faculty of Education, Industrial Arts), 14; Group 3, 19 and Group 4, 20 statements, respectively.

The response given by Group 4 to statement 2 in Part II of the Delphi showed a 47 percent return in the 'Very Desirable' category (Appendix, p. 162). The criterion for the return of statements in the Desirability category was a consensus of less than 60 percent in any cell. Therefore, this statement was returned in Part III (Appendix, p. 172). When the responses of Part III were collated, it was found that the consensus of opinion had risen to 53 percent, but that this consensus of opinion lay in the "Of Little or No Importance" category.

A total of five statements, 2, 9, 17, 19 and 23, were said by the four groups collectively to be Of Little or No Importance; all others were considered Desirable.

In answer to statement 31 (suggestions for a more meaningful term for Industrial Arts), Groups 1 and 2 generally felt that a name change was of little or no importance. Of the 21 returns for Group 3, the term 'Industrial Education' was cited by four participants; three participants said that the title was adequate; two favored 'Industrial Technology.' In Group 4, 14 responses were received. Five respondents of Group 4 suggested 'Social Technology'; four replied 'Technical Education' and two said 'Industrial Education.'

CHAPTER V

SCENARIOS, CONCLUSIONS, IMPLICATIONS

Introduction

In order to determine 'The Role of Industrial Arts in Secondary Schools', 31 statements of curriculum builders reflecting current trends and concerns in the field of Industrial Arts curricula were developed into Delphic form. The Delphi instrument was distributed to four groups, i.e., Group 1, Department of Education Officials; Group 2, Faculty of Education (Industrial Arts, University of Alberta); Group 3, Alberta Industrial Arts teachers; Group 4, third and fourth year students (Industrial Arts, University of Alberta). For the purposes of this study, responses were collected in two categories: (a) the Probable Date of Occurrence of the statements and (b) the Desirability of the implementation of the statement. Chapter IV contained the opinions of the four groups in descending order of consensus.

Chapter V contains scenarios of each group, where possible, according to the Time categories as presented in Part II of the Delphi instrument, i.e., to 1975, to 1985, to 2000. It should be noted that of the statements used in the scenarios, 60 percent were considered to be Very Desirable and 30 percent were considered to be Desirable. (The remaining 10 percent of the statements were considered to be Of Little or No Importance and were, generally, Never seen to occur.)

Scenarios

The Industrial Arts Curriculum - 1975 - Group 1

The technological foundation upon which Industrial Arts is based will be in a constantly changing state. For this reason, Industrial Arts education will be in a constant state of transition as innovations are made, even though there will be some disillusionment with innovation and change generally. (4, 19)

Industrial Arts will become the interpreter of technology and bring out the impact of technology on society. It will be structured to teach knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance. The content of Industrial Arts will broaden to deal with the technical, social and cultural aspects of technology. (3, 7, 25)

The technical aspect of Industrial Arts will involve the students in the explorations of productive society manipulatively both in and out of school. These broad, pre-specialized educational experiences will be career and 'good life' oriented. Skill development will be of secondary importance. (14, 24)

Industrial Arts will also be oriented to the sociological, psychological and biological bases; it will be a phase of general education and will aid in the development of all the school's population. (16)

The Industrial Arts Curriculum - 1985 - Group 1

The task of Industrial Arts will continue to be the promotion of technological fluency, incorporating the technical, human and cultural complexes. (6, 10) However, Industrial Arts will have changed its

identity from a basic subject, and will integrate mathematics, science, communications and the social sciences by its activities. Indeed, it will become the broad base for the interdisciplinary curricula of the future. (5, 6, 10, 21)

Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored. Also, Industrial Arts will permit student collaboration in curriculum formation that will permit diversity of student involvements and display of talents. (11,28)

The Industrial Arts Curriculum - 2000 - Group 1

The results of the study indicate that no developments were seen to probably occur in this time period.

The Industrial Arts Curriculum - 1975 - Group 2

The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact, i.e., it will involve man's mode of thinking, doing and acting within the technologies. Because technologies constantly change, Industrial Arts education will also be in a constant state of transition, even though there will be some disillusionment with innovation and change. (4, 7, 18, 19, 20, 27)

Industrial Arts will provide broad, pre-specialized occupational education experiences which are career and 'good life' oriented, and will teach skills that will be useful in occupational, recreational, consumer and socio-cultural areas. Skill development will be of secondary importance. All students of Industrial Arts will also be able

to explore productive society in and out of school. (14, 24, 25)

Industrial Arts will assist the student in the realization of his talent-capacity by permitting student collaboration in curriculum formation that permit diversity of involvements and display of talents. (11, 26)

Above all, Industrial Arts will strive to promote intelligent citizenship in a post-industrial age. (30)

The Industrial Arts Curriculum - 1985 - Group 2

Industrial Arts will be concerned with the ability of the individual to adapt to technological change, and will be concerned with valuing and knowing about technology as a major force in our culture. A component of the Industrial Arts curriculum will be the presentation of simulation models which show how productive society operates, i.e., the student will learn of the world of work composed of man and technology. Within this context, Industrial Arts will be of fundamental curricular importance in developing manipulative and attitude skills. (8, 12, 15)

Industrial Arts will be a phase of general education and will aid in the development of all the school's population. There will be a common core of learning for all students in Industrial Arts, and each student's program will be individually tailored. It will serve to integrate mathematics, science, communications, the humanities and the social sciences by its activities. Thus, Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology. (3, 5, 16, 28)

Change in the Industrial Arts curriculum will require teachers to

take frequent periods of professional updating. (22)

The Industrial Arts Curriculum - 2000 - Group 2

The results of the study indicate that two statements only (21, 29) would probably occur here (p. 49).

The Industrial Arts Curriculum - 1975 - Group 3

Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts. The technological foundation of Industrial Arts will be in a constantly changing state; therefore, Industrial Arts education will be in a constant state of transition. There will, however, be some disillusionment with innovation and change. (4, 13, 19)

Industrial Arts will be concerned with the ability of the individual to adapt to technological change, and will be structured so that it teaches knowledge and skills that will be useful in life situations involving occupational, recreational, consumer and socio-cultural areas. Industrial Arts curriculum content will be derived from technology. It will interpret technology and involve man's mode of thinking, doing and acting within the technologies; it will concern itself with valuing and knowing about technology as a major force in our culture. (7, 15, 18, 20, 25, 27)

One of the main bases for the economic and social growth of our technological culture will be individual competence, i.e., knowledge skills, manipulative and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills. Industrial Arts will also integrate mathematics, science, communications, the humanities and the social sciences by its activities. (5, 12)

A component of the Industrial Arts curriculum will be the use of simulation models through which the student will learn of the world of work--the man and technology relationship. Industrial Arts will also assist the student in the discovery, development, release and realization of his talent-capacity. (8, 26)

The Industrial Arts Curriculum - 1985 - Group 3

Industrial Arts will provide experiences in terms of qualities and preferences for self-realization, human relationships and responsibilities in our technological culture. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating. (22, 29)

Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored; students will also collaborate in curriculum formation that permit diversity of involvements and display of talents. (11, 28)

The Industrial Arts Curriculum - 2000 - Group 3

Industrial Arts will deal with technology as it relates with the human, the technical and the cultural complexes of the discipline of technology. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Of necessity it will become a basic subject as a phase of general education in school curricula; indeed, Industrial Arts will become the broad base for the interdisciplinary curricula of that time. (10, 16, 21)

The Industrial Arts Curriculum - 1975 - Group 4

Changing technology will necessitate Industrial Arts education to be in a constant state of transition; there will also be some disillusionment with innovation and change. (4, 19)

Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity, and the instructional content will reflect the social institution of industry. (20, 26)

The Industrial Arts Curriculum - 1985 - Group 4

Industrial Arts will be concerned with the ability of the individual to adapt to technological change, and will deal with the technical, social and cultural aspects of the discipline of technology. Industrial Arts will be structured to teach knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance. (3, 7, 10, 15, 25)

Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts, even though there will be disillusionment with some innovation and change, which in turn will require teachers to take frequent periods of professional updating. Industrial Arts will provide courses in broad, pre-specialized occupational experiences which are career and 'good life' oriented. Skill development will be of secondary importance. (13, 14, 19, 22)

The role of Industrial Arts to transmit technological content in our culture will become vital to all students, and will involve thinking, doing and acting within the technologies. It will of necessity become a basic subject in school curricula of the future. The man/technology

relationship--a central theme throughout the history of man--will be the foundation of general education in schools, integrating mathematics, science, communications, the humanities and the social sciences by its activities. (5, 6, 16, 18, 21, 23, 27, 29)

A component of Industrial Arts curricula will be the presentation of simulation models through which the student will learn of the world of work, composed of man and technology. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored; there will also be student collaboration in curriculum formation that permit diversity of involvements and display of student talents. All students of Industrial Arts will also be able to explore productive society manipulatively both in and out of school. Where specific occupations change rapidly, students of post-secondary school age will also find it mandatory to continue their formal education in Industrial Arts. (8, 9, 11, 24, 28)

Above all, Industrial Arts will strive to promote intelligent citizenship in a post-industrial age. (30)

The Industrial Arts Curriculum - 2000 - Group 4

The results of the study indicate that one statement only (2) would probably occur here (p. 68).

A Comparison of Groups

The opinions of the members of Group 1, the Provincial Administrators of Industrial Arts, were overly optimistic in their assessment of curricular inclusions in Industrial Arts to 1975. The researcher feels that the consumership and socio-cultural areas have been practically

ignored in the Provincial Industrial Arts curriculum to date. Furthermore, there seems little reason to assume that these areas will be accomplished before 1975.

There has been much debate in the educational press concerning the education of the student in a post-industrial society. In the field of Industrial Arts, much of this concerns itself with the need for the students' understanding of the impact of technology on society and culture. Indeed, society has always demanded that education be applied to its social needs. Similarly, students also demand that their learning be relevant. In the Industrial Arts curriculum to date, the primary focus has been restricted to technical fluency, materials and processes. Unless Industrial Arts deals with the technological/cultural relationship, cases of "future shock" as related by Alvin Toffler may be incited.

Group 1 undoubtedly must be regarded as the most influential of the four groups. The researcher feels certain that further research into the extent of curricular content in Alberta's Industrial Arts laboratories would provide evidence of very little more than technical pursuits per se as an offering.

Evidence to support this statement was provided by Group 4. This recent high-school population and future teachers of Industrial Arts saw the discipline as closely allied to industry and technology in the derivation of its instructional content. At the same time, the members of this group realize that the curriculum must expand in content to include the pertinent issues of values, technological/cultural interplay and a general orientation to the 'good life'. It could be said that these students were idealistic; the fact remained that they viewed well over 80 percent of all the statements as probably due to occur in the decade

of 1975-85.

The members of Group 2, Department of Industrial and Vocational Education, Faculty of Education, indicated that Industrial Arts will strive to promote intelligent citizenship in a post-industrial age as a matter of priority. The researcher assumes that this feeling may have been projected, at least in part, to their students. However, almost all of the socio-cultural consequences of technological advance, the need for each student to attend classes in Industrial Arts and the general integrative capacity latent in Industrial Arts were not seen to materialize until 1975-85. Moreover, the need for teachers to have frequent periods of professional updating to cope with these foreseen curricular changes was seen to probably occur at the same time that the curricular changes themselves took place.

The opinions of Group 3, Alberta Industrial Arts teachers, showed a preponderently middle-of-the-road approach to the majority of the statements. There were not many points on which a relatively high degree of consensus was formed; similarly, there were few points about which there was no consensus.

Almost 50 percent of the statements were seen to probably occur before 1975. The generally average to low consensus, however, indicates to the researcher that instructional content in Industrial Arts is not consistent throughout the Province. It could also be that such possible idealism expressed by Group 3 had ameliorated when confronted with the practicalities of the Industrial Arts laboratory teaching situation. Furthermore, there could well have been a lack of knowledge on the part of some teachers regarding the whole consideration of the concept of curricular inclusions in Industrial Arts other than the technical.

The members of Group 3 also viewed Industrial Arts becoming a necessity for all students and the base of general education as probably not due to occur until the 1985-2000 time period.

It was apparent that different philosophies regarding the future Industrial Arts curriculum existed at the time of this research. Not to strive for a common purpose and direction for Industrial Arts in the future could well mean that these groups could be in the position of dictating a self-fulfilling prophecy respectively. Surely this would be unsatisfactory. The researcher contends that this research might provide a point of convergence for the four groups for the future potential design of an Industrial Arts curriculum that is technologically/culturally oriented.

Conclusions

Based on the review of the data and the scenarios of the four groups, numerous conclusions could be made. The purpose of this section is not to make a prolific listing of these; instead, the following major conclusions have been identified as being worthy of special note:

1. The number of innovative programs in Industrial Arts suggest dissatisfaction with the programs as they existed during the 1960's and earlier.
2. There will be a marked trend toward the study of productive society in its totality, including industry, as opposed to the study of processes taken from manufacturing industries or craft trades

which terminate in a project made by the student. Future instructional content for Industrial Arts will have to include units taken from socio-cultural studies.

3. There will be a trend away from the past almost total emphasis on manipulative skill development to a balance between skill and knowledge.
4. Industrial Arts is seen to approach the development of a program of career and 'good life' orientation as an integral part of its activities.
5. Attempts will be made to accommodate individual differences. The problem will be one of providing a balance of methods to best meet the diverse needs of students.
6. There will be great emphasis on using the resources of the community; student involvement with local industrialists are seen to contribute relevance to the Industrial Arts program.
7. There will be great emphasis on values and valuing.

Although this is a complex area, it is the result of a society that has provided adequately for the physical comforts of its members. Therefore, it then becomes of even greater importance to raise questions of values. Both technical-industrial and socio-cultural studies will become imperative for all students. Attention to the function of personal integration of students will ensure that students will not become victims of future technology, but that they will be cognizant of evaluated alternatives.

Implications for Further Study

The implications for further study take the form of brief descriptions of suggested studies that could be undertaken in the field of Industrial Arts which would supplement this research.

1. An investigation be conducted by people associated with teacher education with funding from the Department of Education into the de-emphasis of the project as a means to an end--psychomotor skill development, with emphasis placed on instructional content for the Industrial Arts curriculum that is socio-culturally centred.
2. Those responsible for Industrial Arts teacher education in the Province should examine the mix of courses for the Curriculum and Instruction component for the basic model of the Industrial Arts program of studies. This examination should be made so that undergraduate students of Industrial Arts would be exposed to additional social science courses in their program, to adequately prepare them to teach in laboratories where the content will be socio-culturally oriented.
3. Ongoing curriculum research should be conducted by an operations research team to include an Industrial Arts teacher educator. The purpose of this research would be to keep instructional content relevant so that it may be congruent with technological and sociological change.
4. To cope with the technological and sociological changes, Industrial Arts teacher educators at the University should design courses for the upgrading and updating of teachers to keep them abreast of these changes.

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APPENDIX I

This appendix includes a sample copy of the letter mailed to Superintendents of Schools asking them to co-operate in the study.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G 0Y1

December 6, 1973

Dear Sir:

Re: Delphi Study: "The Role of I.A. in Secondary Schools"

I am conducting research in the area of Industrial Arts curriculum.

This study involves the Delphi technique--a series of two questionnaires--to be sent to teachers of Industrial Arts. The object of the study is to ascertain new directions in Industrial Arts curricula. The results will be available to teachers and curriculum developers for their own program development.

I wish to send these questionnaires to a sample of 30 Industrial Arts teachers. A minimal amount of response time (10 minutes) is needed for each questionnaire. I can assure you that the names and data received will be kept in strictest confidence.

The purpose of this letter is to ask for your permission to correspond with those teachers of Industrial Arts in your school area that are involved in the study, in compliance with the wishes of Mr. A. A. Day, Supervisor of Industrial Arts, Department of Education.

Yours truly,

APPENDIX II

This appendix includes a sample copy of the letter mailed to Department of Education personnel informing them of the study.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G 0Y1

January 7, 1974

Dear Sir:

Further to your advice regarding studies involving Industrial Arts teachers--your letter of December 5th.

With your permission, I would like to conduct a Delphi Method Study, "The Role of I.A. in Secondary Schools".

I have contacted all superintendents of schools who have the teachers selected for the study within their jurisdiction for their permission to correspond with their teachers of Industrial Arts.

Yours truly,

APPENDIX III

This appendix contains a sample copy of the covering letter for Part III mailed to Groups 2, 3 and 4.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G 0Y1

February 19, 1974

Dear Colleague:

Thank you for completing Part II of the Delphi study "The Role of Industrial Arts".

The third (and final) part is enclosed in this mailing. It contains some of the statements of Part II about which there was little or no consensus of opinion.

The responses as received in Part II are presented for your information. Please re-indicate either an assertion of your former opinion or a change of opinion regarding the re-presented statements in the light of the additional information.

Thank you again for your active participation.

Yours truly,

APPENDIX IV

In this appendix is a listing of the innovative Industrial Arts programs in North America as identified by Kufahl and Wright.

The current innovative programs in Industrial Arts in North America are as follows (Kufahl & Wright, 1971):

1. The Alberta Plan
2. Enterprise: Man and Technology
3. The Galaxy Plan
4. The Georgia Plan for Industrial Arts
5. Industrial Arts and Technology
6. Industrial Arts Curriculum Project
7. Industrial Arts Education
8. The Maine State Plan
9. Man and Technology as a Structure for Industrial Arts
10. The Maryland Plan
11. Orchestrated Systems.

Kufahl and Wright (1971) explain the method of compilation of the description of the programs thus:

> Using a standard outline structure, a one-page summary of each program was developed. This page was then submitted to each curriculum innovator for validation. Subsequently each page has been updated with the corrections and suggestions by the innovator for the particular program. These summaries, validated during 1971, were presented as current (p. 29).

These following classifications of the various programs are to be included:

I. Name of program
Director's name and address

II. Educational foundations

III. Objectives

IV. Content emphasis

I. Program

THE ALBERTA PLAN
Director: H. R. Ziel
Address: Department of Industrial and Vocational Education
University of Alberta
Edmonton, Alberta

II. Educational Foundations

1. This program is education for a productive society. It is derived from a study of representative materials, technologies and man-technology encounters in our productive society.

III. Objectives

1. To provide an environment where students can reinforce and apply the academic disciplines.
2. To provide exploratory experiences in the various productive aspects of society.
3. To provide a synthesizing educational environment.
4. To provide an introduction to the multiplicity of career opportunities.

IV. Content Emphasis

1. Content is selected on the basis that it will permit accomplishment of the objectives listed above.
2. Each laboratory is highly organized but learning experiences are not highly structured. Individual differences, different learning rates, and different student backgrounds are accommodated within this setting.
3. The variety of learning experiences is directly related to equipment and supplies available as reliable representative samples of these materials and technologies in our society (p. 1).

I. Program

ENTERPRISE: MAN AND TECHNOLOGY
Directors: Originally Ronald W. Stadt; presently James A. Sullivan, Enterprise Co-ordinator
Address: School of Technology
Southern Illinois University

II. Educational Foundations

1. Industrial Arts has evolved from skill development programs. "Enterprise: Man and Technology" is designed to provide broad, pre-specialized occupational education experiences which are career oriented. In such programs typical skill development is of secondary importance.
2. Games can present simulation models which show how productive society operates. In the process of playing the game, students learn the rules, how the model works, and factual information about the real world.
3. Enterprise is the game and consists of the world of work composed of man and technology.

III. Objectives

1. To prepare for entry into productive society.
2. To understand productive society as interrelated enterprises.
3. To define occupations as productive units in enterprise.
4. To specify occupational choice based upon occupational aptitudes, interests, and developing work role expectations.

IV. Content Emphasis

1. The world of work and its dependency upon interrelationships between people and technological resources. Students plan, finance, organize, staff, control, train, and test productive effort (p. 6).

I. Program

THE GALAXY PLAN
Director: Carl H. Turnquist, Divisional Director
Address: Patrick V. McNamara Skills Center
Detroit, Michigan 48209

II. Educational Foundations

1. Each person must merit his place in society.
2. Each individual must contribute to society.
3. Society exists for the good of each one of us.
4. Each and every person is entitled to the pride, dignity, and self-esteem of being self-sufficient and useful.
5. It is the responsibility of each one to prepare and to continually improve.
6. It is also the responsibility of society to see to it that each person in the society is encouraged to improve.
7. Individual competence is the sum total of knowledge skills, manipulative skills and attitude skills.
8. Society must provide the means to help each student learn these skills and to fully develop his investment in them.
9. The total education investment to improve these skills is one of the main bases for the economic and social growth of society.
10. People must be educated for gainful employment and varied ability and interest levels of learners must be considered.
11. Specific occupations are changing in scope very rapidly.
12. Occupational clusters change much more slowly

III. Objectives

All students (both boys and girls):

1. Explore the world of work, manipulatively.
2. Locate what they would like as their first job on their career ladder.
3. Require a saleable skill before or at the time they leave school or graduate.
4. Continue their formal education (when they have freedom of choice).
5. Become as skilled as possible in good inter- and intra-personal relationships.
6. Become more effective and efficient home makers and home operators.

IV. Content Emphasis

1. Galaxy Areas:

   a. Materials and Processes
   b. Energy and Propulsion
   c. Visual Communications
   d. Personal Services (p. 8)

I. Program

THE GEORGIA PLAN FOR INDUSTRIAL ARTS
Director: Donald F. Hackett
Address: Industrial Arts and Technology Division
Georgia Southern College
Statesboro, Georgia 30458

II. Educational Foundations

1. The educational needs of a people stem from the society in which they live. As society changes, so must the educational needs.
2. The school provides the experiences for these needs in terms of qualities and competencies, such as: self-realization, human relationships, economic efficiency and civic responsibility.
3. Industrial Arts is a part of general education because it derives its content from industry, a basic element of our culture, and because it has as its social purpose the greater understanding and control of the phenomena of productive society.

III. Objectives

1. To develop insights and understandings of industry and technology in our culture.
2. To discover and develop interests and capabilities of students in technical and industrial fields.
3. To develop the ability to use tools, materials, and industrial processes to solve technical problems.

IV. Content Emphasis

1. Transportation, manufacturing, communications, American industries, drafting, electricity-electronics, metals, woods, power, and graphic arts (p. 10).

I. Program

INDUSTRIAL ARTS AND TECHNOLOGY
Director: Delmar W. Olson
Address: Co-ordinator, Graduate Studies in Industrial Arts
North Carolina State University
Raleigh, North Carolina

II. Educational Foundations

1. The primary responsibility of the school in any society is to acquaint the young with the nature of the culture in which they live and participate.
2. The American culture is distinctly and uniquely technological.
3. Accordingly it is the responsibility of the American school to acquaint the young with technology.

III. Objectives

1. To interpret technology and bring out its meaning, origin, nature, development, advance, impact on, and consequence for man and society.
2. To assist the student in the discovery, development, release and realization of his talent-capacity.
3. To enable the individual to cope effectively with a technological culture continually in impact with technological advance.

IV. Content Emphasis

Technology is the source of subject matter. As such industrial arts deals with the human complex, the technical complex, and the culture complex (p. 11).

I. Program

INDUSTRIAL ARTS CURRICULUM PROJECT
Directors: Donald G. Lux
Willis E. Ray
Address: Ohio State University
1712 Neil Avenue, Oxley Hall
Columbus, Ohio 43210

II. Educational Foundations

1. Industrial Arts is a study of the technology of industry.
2. Man has been and remains curious about industry.
3. Industry is so vast a societal institution that it is necessary, for instructional purposes, to place an emphasis on conceptualizing a fundamental structure of the technology of industry.
4. Man's knowledge can be categorized and ordered logically.
5. The educator should codify and structure disciplined bodies of knowuedge.

6. The structure of a body of knowledge can be developed before the total curriculum is designed.
7. All domains of man's knowledge must be included in an effective general educational program.

III. Objectives

1. The learner will: understand broad concepts and principles of industrial technology.
2. Have an interest in and an appreciation for industry as that element of the economic system which provides industrial material goods for satisfaction of human wants for those goods.
3. Demonstrate knowledge and skills that will be useful in life situations of occupational, recreational, consumer, and socio-cultural significance.

IV. Content Emphasis

Industry is divided into:

a. Construction
b. Manufacturing

Industrial technology is divided into:

a. Management practices
b. Production practices
c. Personnel practices (p. 12)

I. Program

INDUSTRIAL ARTS EDUCATION
Director: American Vocational Association
Address: 1510 H Street N.W.
Washington, D.C. 20005

II. Educational Foundations

1. The technological foundation upon which industrial arts is based is in a constantly changing state. For this reason industrial arts education must be in a constant state of transition. Industrial arts is a study of the basics of technology. It is a phase of general education. Its body of knowledge is related to the total institution of industry and is expressed in terms of descriptive concepts involved.

III. Objectives

1. Develop an insight and understanding of industry and its place in our culture.
2. Discover and develop talents, aptitudes, interests, and potentialities of individuals for the technical pursuits and applied sciences.
3. Develop an understanding of industrial processes and the practical application of scientific principles.
4. Develop basic skills in the proper use of common industrial tools, machines, and processes.
5. Develop problem-solving and creative abilities involving the materials, processes and products of industry.

IV. Content Emphasis

Today's demands require our approach aimed at organizing basic concepts common to, and drawn from, all disciplines or areas of knowledge related to the total institution of industry. The structure of industrial arts will reflect the social institution of industry from which the instructional content for industrial arts education should be derived (p. 14).

I. Program

THE MAINE STATE PLAN
Director: Under direction of State Consultant in Industrial Arts, Carl Butler
Address: State Department of Education
Augusta, Maine

II. Educational Foundations

1. Program that more nearly reflects industry and technology within the framework of the comprehensive general laboratory.

III. Objectives

1. Develop an understanding of industry and technology and their impact on society.
2. Develop skill in the use of tools, machines, equipment and their related processes.
3. Develop desirable attitudes toward work, workers and the products and services of industry.

IV. Content Emphasis

1. Classification of industries into:

   a. Manufacturing
   b. Construction
   c. Electrical-Electronics
   d. Power-Transportation
   e. Service (p. 17)

I. Program

MAN AND TECHNOLOGY AS A STRUCTURE FOR INDUSTRIAL ARTS
Initiator and Student of the Structure of Technology: Paul W. DeVore
Address: College of Human Resources and Education
West Virginia University
Morgantown, West Virginia

II. Educational Foundations

1. A discipline and structure of knowledge base. Content derived from the technologies including man's modes of thinking, doing and acting in the technologies.
2. Man and Technology - a central theme throughout the history of man. The base of modern society.
3. An intellectual discipline. A cumulative knowledge base.
4. "What to teach" must be determined before one engages in "how to teach". Not enough study has been done to determine "What to teach".

III. Objectives

1. Based upon objectives derived from:

   a. the discipline of technology - a cumulative knowledge base.
   b. educational objectives (local, state, national, individual).
   c. instructional objectives.

2. Concerned with:

   a. adaptability to technological change.
   b. intelligent citizenship in a participatory democracy in a post-industrial age.
   c. valuing and knowing about technology as a major force in our culture.
   d. Educating youth for a culture dominated by technology.

Objectives are related to the basic tenets of technology. Technology is:

1. Problem oriented
2. Future oriented
3. Activity oriented
4. Environmentally centered.

IV. Content Emphasis

1. The content base for industrial arts is Technology (with a capital T). A study of the past, an analysis of the present and a projection to the future identifies man as:

Central themes

a. ~~a-builder~~
b. a communication
c. a producer
d. ~~a-developer~~
e. transporter
f. ~~an-organizer~~
g. ~~a-craftsman~~

(The areas crossed out have been subsumed in the classification under communications, transportation and production.)

2. Emphasis is on man as the creator of the Technology including innovation, invention, history, contemporary problems, projected solutions, etc.

3. Each of these areas identifies a vast storehouse of technics and knowledge which form the core elements (both technical and social/cultural) of the discipline of technology.

4. The resulting structure is externally stable yet internally flexible and adaptable to change (pp. 18-19).

I. Program

THE MARYLAND PLAN
Director: Donald Maley
Address: Industrial Education Department
University of Maryland
College Park, Maryland

II. Educational Foundations

1. Industrial Arts must be oriented to the sociological, psychological and biological bases.

2. Industrial Arts is a phase of general education and must focus on the development of people.
3. Industrial Arts can be made attractive, meaningful, and of value to practically all of the school's population.

III. Objectives

1. The integration of mathematics, science, communications and the social sciences into the industrial arts activities.
2. The maximum use of the community resources extending from school, state, national and international.
3. The use of a wider range of reading materials at all levels of difficulty and sophistication.
4. The extensive use of inquiry, problem solving and experimentation.
5. The effective and meaningful use of "role playing" as a technique for greater student involvement.
6. The extensive use of student activities that permit diversity of involvement and display of talents.
7. The development of experiences in keeping with the behavioral and developmental tasks of youth.

IV. Content Emphasis

1. The study of industry by centering on the nature and place of science and invention in industry.
2. The content is presented through a research and experimentation approach, group project study, line production, uni-organization, and individual study (p. 20).

I. Program

ORCHESTRATED SYSTEMS
Director: L. W. Yoho
Address: School of Technology
Indiana State University

II. Educational Foundations

1. This approach originated by reflection upon the human being, examining the "human-life-system", and by centering attention upon the sub-system: the processes which man employs in the production of his goods and services and which contribute to his life experience.

III. Objectives

1. To develop knowledges and competencies to understand and participate in the production of goods and services.
2. To provide experiences in relation to supportive skill and technical knowledge requirements such that:
   a. the whole of our production system is understood in relation to its parts;
   b. specialization is understood in its contributing role;
   c. dynamics of change are understood as functions of man's creative nature and natural responsibility.
3. To retain the connectiveness of the total "human-life-system" with all its subsystems but with priority on the production of goods and services.
4. To provide synergistic experiences from orchestrating the elements of the functioning production system.

IV. Content Emphasis

1. Content is identified through system-modelling technique. The result is a contextual organization appropriate for dealing with both the amount and variability of content (p. 23).

APPENDIX V

This appendix includes Part I and Part II of the Delphi instrument which was presented to Group 1 and mailed to Groups 2, 3 and 4.

FACULTY OF EDUCATION
DEPARTMENT OF INDUSTRIAL AND
VOCATIONAL EDUCATION
TELEPHONE (403) 432-3678

THE UNIVERSITY OF ALBERTA
EDMONTON, ALBERTA, CANADA
T6G 0Y1

January 17, 1974

Dear Colleague:

I am collecting opinions regarding curriculum trends in Industrial Arts.

The method used to gather these opinions is called the Delphi Technique. The technique is based on the premise that it is possible to influence the direction of future trends by planning, based on informed, intuitive judgments.

The procedure is as follows:

1. A series of statements (Part I) is in this mailing for you to read. (You may not necessarily agree with these statements, for they may be contradictory; they simply serve as an orientation to the problem.) You may keep Part I. (Time needed approximately 5 minutes)

2. Part II, also included in this mailing, is comprised of a list of topical statements made by authorities in the Industrial Arts and allied fields. You are asked to rate these statements according to your opinion of:

   (a) the possible date of implementation of that statement in Industrial Arts curriculum;

   (b) the desirability of occurrence of that statement. (Time needed approximately 10 minutes)

3. Later, a second and final mailing may be used (Part III). This will report on the consensus of opinions of Part II and will represent any Part II statements requiring further revision or specificity of opinion.

The time needed to complete each section is minimal. Your participation is invaluable and will be sincerely appreciated.

Yours truly,

DELPHI INVESTIGATION

THE ROLE OF INDUSTRIAL ARTS IN SECONDARY SCHOOLS

Part I

STATEMENTS

1. "In the three short decades between now and the turn of the next millenium, millions of psychologically normal people will experience an abrupt collision with the future. Affluent, educated citizens of the world's richest and most technically advanced nations, they will fall victim to tomorrow's most menacing malady: the disease of change. Unable to keep up with the supercharged pace of change, brought to the edge of breakdown by incessant demands to adapt to novelty, many will plunge into future shock. For them, the future will have arrived too soon."

   (Toffler, 1970, p. 94)

2. "One of the most pressing needs for the individual in the decades ahead will be for psychological mechanisms and strategies necessary to cope with rapid technological and social change . . . In order to develop more effective psychological strategies for coping with rapid change, much greater demands will be made on all institutions, and particularly schools, to permit sound mental development. In fact, more education and training will be one set of strategies which will become increasingly important in coping with change."

   (Dyck, 1970, p. 23)

3. ". . . Get into the curriculum the problems likely to be facing young adults in 1980. These persons currently are in the primary years of schooling. If we begin now we could plan . . . (curriculum around current problems)."

   (Goodlad, 1967, p. 57)

4. "We can no longer afford the kind of formalized education which takes the child into the future with his gaze fixed steadfastly on the past. Somehow we must convince our patrons that it is more important to help the child think about the next civilization than to require him to remember the facts of the last one."

   (Rubin, 1969, p. 24)

5. "Technology's impact upon how men worked and lived was too potent to be ignored. If they wished to have control over their destinies . . . they must also have some control over their technology."

   (Kranzberg, 1973, p. 23)

6. "Along with its wonderful productivity, our technology has generated side effects that suddenly converge upon us with bewildering speed: pollution, contamination of the earth and sea and air, urban rot, the depletion of key resources, and simultaneously the prospect of annihilation and of more people than the world can hold--to mention but a few."

   (Wilhelms, 1970, p. 368)

7. ". . . For the first time in history our society has the awareness and the technological means needed to control change and to choose our destiny. But we do need to act on this potential--and to act quickly. Not to do so would be to forfeit our key to a better life in the years ahead."

   (Worth, 1972, p. 36)

8. "One place to begin is with our educational system. Its efforts must be more clearly defined and its resources concentrated at the points of greatest effect. Recognition of this need should impel us toward a different conception or vision of education. This vision must both reflect and contribute to a larger vision of the quality of life itself."

   (Worth, 1972, p. 36)

9. ". . . a 'now' and 'future' oriented [industrial arts] program . . . should enable the individual to anticipate certain kinds of changes in society and to have in some degree studied or evaluated some of the alternatives in the changing world."

   (Maley, 1973, p. 261)

10. "Education may be reduced to indoctrination, prescribed skill development, induced satisfaction, and routinized searches for pleasure and comfort. Yet, it could become individualized, relevant, and enriched by the tools of technology and world-wide resources of people, places, and things. There could be lifelong growth in knowledge, insights, and competencies for all humans. There could be a satisfying mix of that which humanizes and that which facilitates effective, competent citizenship."

    (Feasibility Study: BSTEP, 1970, p. 245)

11. "By the year 2005 the hours of the work day and the work week will be reduced. The annual vacation and the age of entry into the work force will increase, and the age of retirement will lower. 'One major use of this leisure time will be for education (retraining, continuing education, outdoor education) and intellectual pursuits. A major problem resulting from increased leisure time will be designing education to use leisure time.'"

    (Dyck, 1970, pp. 13-14)

12. "The era of person-to-person teaching--the teaching of specific states, facts, etc.--will give way to the age of student enquiry and discovery in the twenty-first century. The teacher will provide the direction, and if necessary, the stimulus toward the learning process. This will be lifelong benefit."

    (Burton, 1969, quoted by HRRC, 1970, p. 260)

13. "Students will have a major voice in policy decisions directly affecting them."

    (Congress on the Future of Education, Edmonton, December, 1970)

14. "Technology has been the dominant influence in the process of man civilizing himself. It continues to dominate our lives. Our culture is distinctly technological. Technology is an integral, central, part thereof."

    (Hackett, 1973, p. 217)

15. "A study of history reveals the gradual and continuous change in cultural patterns . . . Thus, the school's curriculum must likewise develop. This is equally true of industrial arts as it is in any area of the curriculum. It is for this reason that it seems necessary for us to look very carefully at the major societal forces to which the school should direct its attention, with special emphasis upon those areas of human life which affect us in the 70's."

    (Wolfe, 1973, p. 36)

16. "Civilization may be at a new stage of development where new questions must be formulated about man, society, technology and education. One does not need to engage the questions for too long before it is recognized that the technology of today is totally different from the technology of yesterday. Technology today has great power and potential for man, both creatively and destructively. The advent of the cybernetic age has brought forth new questions for man about what it means to be free and a human being. The potential is available for placing absolute control in the hands of a select few. Thus, the social and human implications of modern technology are the most critical of any questions about education in a technological society."

    (De Vore, 1973, p. 200)

17. "Why do teachers in the humanities and social sciences look down upon those concerned with the trades, skills, and occupations which occupy so much of man's time and energy and which have been the chief medium of his material advance throughout the centuries?"

    (Kranzberg, 1973, p. 27)

References for Quoted Statements: Part I

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Toffler, A. Future shock. New York: Random House, 1970.

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Wolfe, D. P. Major societal forces affecting schools in the '70's. ACIATE Yearbook. Bloomington: McKnight Publishing Co., 1973.

Worth, W. H. A choice of futures. Report of the Commission for Educational Planning (CEP). Edmonton: Queen's Printer, 1972.

Delphi Investigation: The Role of Industrial Arts

PART II

Further descriptive statements are submitted here for your further consideration.

The Task. Mark with an "X" the most likely date (50% probability) when you think that the statement will be descriptive of Industrial Arts. If you believe that the statement is descriptive of Industrial Arts now, or will be by 1975, mark an "X" in the first column; mark the columns 1975-85 or 1985-2000 respectively if they seem more likely to contain the time period in which you think the statement will become true.

If you believe that the statement will never be descriptive of Industrial Arts, mark an "X" in the column headed "Never". A space is provided should you wish to give reasons for your choice.

Would you please further indicate (by use of an "X") the column which you feel most accurately reflects the Desirability of Occurrence of the statement, i.e., very desirable, desirable, of little or no importance.

Deadline. Please return these sheets in the envelope provided by January 31, 1974.

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.								
2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.								
3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.								
4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.								
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.								

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.								
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.								
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]								
9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.								

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.								
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.								
12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.								
13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.								

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.								
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.								
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.								
17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.								

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.								
19. There will be disillusionment with innovation and change in Industrial Arts.								
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.								
21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.								
22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.								

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.								
24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.								
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.								
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.								
27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.								

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.								
29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.								
30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.								
31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.								

Name_____

Institution_____

Date_____

APPENDIX VI

This appendix includes the raw data for Part II of the Delphi instrument that was collected for Group 1.

The percentage scores for this and later groups do not always total 100 percent because of rounding.

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.		*		*		*	*	
2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.				* *				* *
3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.	* *					* *		
4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.	* *					* *		
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.		* *			Optimistic.	* *		

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.		* *			If is the operational word, other subjects can do this also.	*	*	
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.	* *				We are trying to do this now--how successfully is open to question.	* *		
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]	*			*	Learn by doing. The monies spent on models does not equate to its educational impact. Already in, desirable, but models should not take over--we need realism.		*	*
9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.				* *	Definition of I.A.--confusion here. In the U.S., I.A. is job preparation, not so in Canada.	*	*	

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.		* *				* *		
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.		* *			Hope we get there quickly.	* *		
12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.	*	*				*	*	
13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.	*	*				*	*	

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.	* *				Students get led as in English or German system.	*	*	
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.	*	*				* *		
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.	* *				It does now.	* *		
17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.				* *	Is I.A. a discipline or is it basically a methodology? "Undesirable"			* *

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.	*	*				* *		
19. There will be disillusionment with innovation and change in Industrial Arts.	* *				There is disillusionment generally. Substitute frustration for disillusionment.		*	*
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.	*			*	The total content of I.A. is much wider than suggested by the statement.		*	*
21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.		* *			Good innovation.	* *		
22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.	*		*		"Require" is a scary word in this context.	* *		

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.		*	*		Maybe.		* *	
24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.	* *				More "bright" students are entering the program now.	* *		
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.	* *				Last 2 are not being done.	* *		
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.	* *					* *		
27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.	*			*	Too definite in concept; cf. #23.	*		*

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.		* *			Good share done right now.	* *		
29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.	*	*			This concept is included in our curriculum--the better programs incorporate it.	*	*	
30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.				* *	'Above all' difficult to reconcile.	*		*
31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.	See p. 44.							

Name_____

Institution_____

Date_____

APPENDIX VII

This appendix includes Parts II and III of the Delphi instrument and includes raw data for Group 2 and a table of convergence for this Group.

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.	11	22	11	56		67	22	11
2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.	0	0	11	89		0	11	89
3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.	11	56	22	11		67	22	11
4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.	67	11	0	22	If the brass are with it. Not until Industrial Arts teacher educators learn to cope with change, and their personal bias for a particular material or technology.	78	22	0
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.	22	56	0	22	Until basic concepts of the various school subjects are identified and interrelated with I.A., this may never be achieved.	67	22	11

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.	11	22	11	56	Hard row to hoe. Bias of administrators will prevent this from occurring.	67	22	11
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.	44	22	22	11	A de-emphasis of the project and an emphasis of concepts will have to be implemented.	33	67	0
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]	33	33	33	0		44	56	0
9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.	11	0	11	78	They will look upon I.A. for leisure pursuits only.	11	22	67

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.	22	22	11	44	A radical change will have to be instituted in the way that I.A. teachers are prepared.	33	56	11
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.	33	11	11	44	Dept. of Ed. will never permit a concept like this to be initiated. They would lose too much control of I.A. Ed.	22	67	11
12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.	11	56	11	22		22	67	11
13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.	11	22	22	44	Research equals money. I.A. doesn't have it.	67	22	11

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.	67	11	22	0		44	44	11
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.	33	44	11	11	To help teach the student how to cope with change in his adult life.	78	11	11
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.	22	44	22	11	There are too many programs in the school that are vying for the students' time.	67	33	0
17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.	11	11	0	67	[no response 11%] Biases of I.A. teachers, vested interests will prevent this from becoming reality.	11	33	44

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.	78	22	0	0		44	67	0
19. There will be disillusionment with innovation and change in Industrial Arts.	78	0	0	22	Teachers tend to become competent and will not know how to work within a changed frame of reference.	11	11	78
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.	56	22	11	11		44	44	11
21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.	11	11	44	33	It will be highly individualized and interdisciplinary in its approach.	78	11	11
22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.	22	56	22	0	I hope. Must be if they are to be kept up to date on new materials, etc.	100		

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.	11	0	44	44	Provided each is taken in its broadest context to include society and its influence on society.	11	67	22
24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.	56	11	22	11	Student age and manpower legislation will prevent this from becoming reality.	11	78	11
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.	44	22	11	22	Too broad a statement in context. Sounds as though I.A. is going to be the savior of mankind. Is it?	33	67	0
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.	56	22	11	11	Only if I.A. teachers permit students to design, develop, make what they want to.	67	22	11
27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.	56	22	11	11	We presently do not have these kinds of people	67	33	0

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.	22	56	11	11	When I.A. teachers start to design their instructional material, individual programs will become available.	67	33	0
29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.	11	22	44	11	[no response 11%] All this and motherhood too!	22	67	0
30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.	56	11	22	11	Providing it co-operates with other subject matter teachers.	44	56	0
31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.	See p. 54.							

Name_____

Institution_____

Date_____

Delphi Investigation: The Role of Industrial Arts

PART III

Seven of the statements descriptive of Industrial Arts are listed below for your further consideration.

The responses provided by panelists in Part II regarding those statements are provided in percentage form. They show that the responses for one statement (No. 8) are spread over the time and desirability scales. One statement (No. 11) is bipolar, in that there are two 'clusters' indicating the most likely date of occurrence of that statement; the responses to the other statements show spread over the desirability scale.

Considering the added information of the previous responses (i.e., percentage return figures), please re-do the seven items. As before, mark with an "X" the most likely column (50% probability) that you think represents the statements. Please give reasons to explain your choice.

Deadline. Please return these sheets in the envelope provided by March 6, 1974.

Name_____

Institution University of Alberta

Date_____

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]	33%	33%	33%	0	Needs more time to be developed. Good as alternative to 'actual' experience.	44%	56%	0
	11	67	22	0		22	78	0
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.*	33%	11%	11%	44%	O.K., new information helps me--I think.			
	22	22	11	44				

*Regarding statement no. 11, 44% of the respondents marked 1970-75 and 33% marked Never. Eleven per cent marked 1975-85 and 1985-2000, respectively. The statement was included to express the concept of student collaboration in curriculum formation at the local (school) level. In the knowledge of this intended meaning of the statement, please re-indicate your position regarding the probable date of occurrence of the statement.

Statements	Reasons	Desirability of Occurrence		
		Very Desirable	Desirable	Of Little or No Importance
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.	Complexes of which you speak are interrelated.	33%	56%	11%
		22	78	0
14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance		44%	44%	11%
		44	56	0
17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.	no response 11%	11%	33%	44%
		11	22	67
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.	The term 'industry' is just a little too narrow.	44%	44%	11%
		33	67	0
30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.		44%	56%	0
		33	67	0

Table VII-1

Convergence: Group 2 - Faculty of Education, Industrial Arts (University of Alberta)

Statement	% Response		Convergence
	Part II	Part III	
* **8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]	33* 56**	67* 78**	+34* +22**
*11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.	44*	44*	0*
**10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.	56**	78**	+22**
**14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.	44**	56**	+12**
**17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.	44**	67**	+23**
**20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry. industry.	44**	67**	+23**
**30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.	56**	67**	+11**

*Refers to Time
**Refers to Desirability

APPENDIX VIII

This appendix includes Parts II and III of the Delphi instrument and includes raw data for Group 3 and a table of convergence for this Group.

Delphi Investigation: The Role of Industrial Arts

PART II

Further descriptive statements are submitted here for your further consideration.

The Task. Mark with an "X" the most likely date (50% probability) when you think that the statement will be descriptive of Industrial Arts. If you believe that the statement is descriptive of Industrial Arts now, or will be by 1975, mark an "X" in the first column; mark the columns 1975-85 or 1985-2000 respectively if they seem more likely to contain the time period in which you think the statement will become true.

If you believe that the statement will never be descriptive of Industrial Arts, mark an "X" in the column headed "Never". A space is provided should you wish to give reasons for your choice.

Would you please further indicate (by use of an "X") the column which you feel most accurately reflects the Desirability of Occurrence of the statement, i.e., very desirable, desirable, of little or no importance.

Deadline. Please return these sheets in the envelope provided by January 31, 1974.

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.	3	27	7	63	Society is too reluctant to shoulder the added cost.	33	60	7
2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.	7	19	7	67	A saleable skill is not necessarily desirable in I.A., it should not be preparation for a job.	20	20	60
3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.	33	37	20	10	I.A. will change to more social and cultural concerns due to its increasing effect on life.	[no response 3%] 67	27	3
4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.	70	17	10	3	I.A. has to change with the times.	[no response 3%] 73	20	3
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.	47	27	13	13	If it does it will not be under the name of I.A. Other teachers complain now that we include their fields.	[no response 3%] 70	23	3

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.	20	37	30	13	People will have to get off their 'academic' kick.	63	30	7
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.	46	40	7	7		64	33	3
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]	43	33	17	7		67	30	3
9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.	40	10	13	33	[no response 3%] This will become increasingly so.	50	23	23

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.	[no response 3%] 23	23	47	3		36	64	3
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.	27	44	16	13	We should cater more to student preference of subject areas.	47	43	10
12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.	47	30	7	13	[no response 3%]	73	20	3
13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.	43	37	7	13	We need more of this.	77	13	10

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.	[no response 3%] 60	23	7	7		67	26	17
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.	44	30	13	13	We all must have this ability to cope.	67	26	17
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.	20	23	47	7	[no response 3%]	43	41	13
17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.	[no response 3%] 17	13	17	50		[no response 10%] 3	13	73

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.	44	30	23	3		30	60	10
19. There will be disillusionment with innovation and change in Industrial Arts.	[no response 3%] 50	23	0	23	This may reverse as I.A. accepts challenges.	[no response 7%] 3	10	80
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.	53	30	10	7		27	63	10
21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.	[no response 3%] 17	17	40	23	Humanity-oriented administrators will not 'allow' a technological culture in schools.	17	63	20
22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.	[no response 3%] 40	40	13	3	Most of us do this now.	87	13	0

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.	[no response 7%] 17	17	17	42		20	33	47
24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.	20	37	33	10		64	33	3
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.	[no response 3%] 47	27	13	10		74	13	13
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.	73	21	3	3		67	30	3
27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.	54	23	10	13		37	47	17

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.	23	47	21	10		67	30	3
29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.	30	47	23	0		33	63	3
30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.	27	20	17	37		10	73	17
31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.	See p. 64							

Name_____

Institution_____

Date_____

Delphi Investigation: The Role of Industrial Arts

PART III

Six of the statements descriptive of Industrial Arts are listed below for your further consideration.

The responses provided by panelists in Part II regarding those statements are provided in percentage form. They show that one statement (No. 9) is bipolar, in that there are two 'clusters' indicating the most likely date of occurrence of that statement. Others show spread over the desirability scale. Considering the added information of the previous responses (i.e., percentage return figures), please re-do the six items. As before, mark with an "X" the most likely column (50% probability) that you think represents the statement. Please give reasons to explain your choice.

Deadline. Please return these sheets in the envelope provided by February 25th 1974.

Name_____

Institution_____

Date_____

For this statement 40% of the respondents marked 1970-75 and 33% marked never. Ten per cent and 13% of the respondents marked 1975-85 and 1985-2000 respectively. The statement was included to express the concept of the increasing appropriateness of Industrial Arts in coping with occupational change in our technological society.

In the knowledge of this intended meaning of the statement, please re-indicate your position regarding the probable date of occurrence and the desirability of the occurrence of the statement.

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.	40%	10%	13%	33%	no response 3%	50%	23%	23%
	33	33	7	27	This would require further strain on the tax dollar; unsure whether I.A. will receive adequate funding for this concept.	53	20	27

Statements	Reasons	Desirability of Occurrence		
		Very Desirable	Desirable	Of Little or No Importance
1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.	no response 3%	33%	40%	23%
	I.A. holds equal importance with language, mathematics, sciences.	33	60	7
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.		47%	43%	10%
	A sign of the times is that more and more people are asking to have a say in their future.	53	47	0
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.	no response 3%	43%	41%	13%
	There is a definite relationship between all these areas.	73	27	0
23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.		20%	33%	47%
	The impact of technology on man's way of life is here to stay. I.A. will have to be the foundation of general education.	13	27	60
27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.	True! The key point for Industrial Education.	37% 40	47% 60	7% 0

Table VIII-1

Convergence: Group 3 - Alberta Industrial Arts Teachers

Statement	% Response		Convergence
	Part II	Part III	
* **9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.	40* 50**	33* 53**	-7* +3**
**1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.	40**	60**	+20**
**11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.	47**	53**	+6**
**16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.	43**	73**	+30**
**23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.	47**	60**	+13**
**27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.	47**	60**	+13**

*Refers to Time
**Refers to Desirability

APPENDIX IX

This appendix includes Parts II and III of the Delphi instrument and includes raw data for Group 4 and a table of convergence for this group.

Delphi Investigation: The Role of Industrial Arts

PART II

Further descriptive statements are submitted here for your further consideration.

The Task. Mark with an "X" the most likely date (50% probability) when you think that the statement will be descriptive of Industrial Arts. If you believe that the statement is descriptive of Industrial Arts now, or will be by 1975, mark an "X" in the first column; mark the columns 1975-85 or 1985-2000 respectively if they seem more likely to contain the time period in which you think the statement will become true.

If you believe that the statement will never be descriptive of Industrial Arts, mark an "X" in the column headed "Never". A space is provided should you wish to give reasons for your choice.

Would you please further indicate (by use of an "X") the column which you feel most accurately reflects the Desirability of Occurrence of the statement, i.e., very desirable, desirable, of little or no importance.

Deadline. Please return these sheets in the envelope provided by

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
1. Having paid due consideration to varied ability/interest levels, Industrial Arts will be mandatory for all students, male and female.	3	30	7	60		23	67	10
2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.	17	6	60	17	To teach a skill is not the purpose of I.A.	47	20	33
3. The content of Industrial Arts will deal with the technical, social and cultural aspects of the discipline of technology.	17	60	23	0	Educational philosophers today are greatly concerned with this aspect.	73	27	0
4. The technological foundation upon which Industrial Arts is based is in a constantly changing state. For this reason Industrial Arts education will be in a constant state of transition.	73	24	3	0		83	17	0
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.	50	17	33	0		73	27	0

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	'1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
6. If Industrial Arts accepts the task of promoting technological fluency, then it will of necessity become a basic subject in school curricula in our technological culture.	7	60	17	17		40	60	0
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.	27	37	33	3		33	67	0
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]	20	63	17	0		57	37	7
9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.	33	43	23	0	This will escalate as the years go by.	50	47	3

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
10. Industrial Arts will deal with technology as it relates with the human complex, the technical complex, and the cultural complex.	20	57	23	0	I.A. is beginning to be directed this way now.	70	30	0
11. Industrial Arts will permit student collaboration in curriculum formation that permit diversity of involvements and display of talents.	17	60	20	3		67	33	0
12. One of the main bases for the economic and social growth of our technological culture is individual competence, i.e., knowledge skills, manipulative skills and attitude skills. Industrial Arts will be of fundamental curricular importance in developing these skills.	17	60	10	13	I.A. will never receive the primary importance necessary to implement this.	67	20	13
13. Consistent adequate research into "what to teach" will ensure relevant course content in Industrial Arts.	23	68	0	9		90	10	0

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
14. Industrial Arts will provide courses in broad, pre-specialized occupational education experiences which are career and 'good life' oriented. Skill development will be of secondary importance.	33	60	7	0		37	63	0
15. Industrial Arts will be concerned with the ability of the individual to adapt to technological change.	30	60	10	0		97	3	0
16. Industrial Arts will be oriented to the sociological, psychological and biological bases, i.e., as a phase of general education it can aid in the development of all the school's population.	7	63	23	7		20	70	10
17. Industrial Arts will become an intellectual discipline, with a cumulative knowledge base.	10	24	33	33		70	27	3

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
18. Industrial Arts will be concerned with valuing and knowing about technology as a major force in our culture, i.e., educating youth for a predominantly technological culture.	30	53	17	0		67	33	0
19. There will be disillusionment with innovation and change in Industrial Arts.	90	10	0	0	Yes.	20	20	60
20. The instructional content for Industrial Arts education will be derived from, and should reflect the social institution of, industry.	57	26	0	7		30	60	10
21. The role of Industrial Arts to transmit technological content in our culture will become vital to all students. Indeed, it will become the broad base for the interdisciplinary curricula of the future.	13	60	27	0		73	27	0
22. Change in the Industrial Arts curriculum will require teachers to take frequent periods of professional updating.	27	67	6	0	Essential.	87	13	0

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
23. The man/technology relationship--a central theme throughout the history of man, and the base of modern society--will be the foundation of general education in schools.	20	63	7	10		37	60	3
24. All students of Industrial Arts will be able to explore productive society manipulatively in and out of school.	10	70	20	0		70	30	0
25. Industrial Arts will be structured so that it teaches knowledge and skills that will be useful in life situations of occupational, recreational, consumer and socio-cultural significance.	20	60	20	0		86	7	7
26. Industrial Arts will assist the student in the discovery, development, release and realization of his talent-capacity.	60	10	23	7		90	3	7
27. Industrial Arts curriculum content will be derived from technology, and must involve man's mode of thinking, doing and acting within the technologies.	33	47	17	3		67	23	10

Statements	Probable Date of Occurrence				Reasons	Desirability of Occurrence		
	1970-75	1975-85	1985-2000	Never		Very Desirable	Desirable	Of Little or No Importance
28. Although there will be a common core of learning for all students in Industrial Arts, each student's program will be individually tailored.	7	63	27	3		74	23	3
29. Industrial Arts will provide experiences in terms of qualities and preferences for self realization, human relationships and responsibilities in our technological culture.	13	64	23	0		67	33	0
30. Industrial Arts will, above all, strive to promote intelligent citizenship in a post-industrial age.	10	80	10	0		80	20	0
31. 'Industrial Arts' as a title is inadequate to convey its purpose. Please suggest another more meaningful term.	See p. 74							

Name_____

Institution_____

Date_____

Delphi Investigation: The Role of Industrial Arts

PART III

Five of the statements descriptive of Industrial Arts are listed below for your further consideration.

The responses provided by panelists in Part II regarding those statements are provided in percentage form. They show that one statement (No. 5) is bipolar, in that there are two 'clusters' indicating the most likely date of occurrence of that statement. One statement (No. 7) shows spread over the time scale; the others show spread over the desirability scale. Considering the added information of the previous responses (i.e., percentage return figures), please re-do the five items. As before, mark with an "X" the most likely column (50% probability) that you think represents the statements. Please give reasons to explain your choice.

Deadline. Please return these sheets in the envelope provided by March 5, 1974.

Name_____

Institution_____

Date_____

Regarding statement no. 5, 50% of the respondents marked 1970-75 and 33% marked 1985-2000; 17% marked 1975-85. The statement was included to express the concept of Industrial Arts as the basis of general education. In the knowledge of the intended meaning of the statement, please re-indicate your position regarding the probable date of occurrence of the statement.

Statements	Probable Date of Occurrence				Reasons
	1970-75	1975-85	1985-2000	Never	
5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.	50%	17%	33%	0	There is not enough recognition given by the system regarding the assets of I.A. These subjects are deeply embodied in I.A.
	20	60	20	0	
7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.	27%	37%	33%	3%	Too late for the 1970-75 date. This will be fully accepted by 1985. Current situations will make this change pressingly relevant.
	13	60	13	13	

Statements	Reasons	Desirability of Occurrence		
		Very Desirable	Desirable	Of Little or No Importance
2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.	If students are interested in trade training they should work within the trade. I.A. should offer a wide area of technical activities.	47%	20%	33%
		33	13	53
8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]	It is very necessary for the student to relate with the real life situation. This should be the philosophy of I.A.	57%	37%	7%
		87	13	0
9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.	Industrial Arts will have to become more specialized. As long as people work they will be required to upgrade themselves.	50%	47%	3%
		67	33	0

Table IX-1

Convergence: Group 4 - Third and Fourth Year Students, Industrial Arts, University of Alberta

Statement	% Response		Convergence
	Part II	Part III	
*5. Industrial Arts will integrate mathematics, science, communications, the humanities and the social sciences by its activities.	50*	60*	+10*
*7. Industrial Arts will interpret technology and bring out its meaning, origin, nature, development, advance and impact.	37*	60*	+23*
*2. Where industrial arts is optional, an Industrial Arts objective will be to equip all students registered in Industrial Arts with a saleable skill before they leave school or graduate.	47**	53**	+6**[1]
*8. A component of Industrial Arts curricula will be the presentation of simulation models which show how productive society operates. [The student learns how the model works, i.e., learns of the world of work composed of man and technology.]	57**	87**	+30**
*9. In a changing technological society where specific occupations change rapidly, students of post-secondary school age will find it mandatory to continue their formal education (when they have freedom of choice) in Industrial Arts.	50**	67**	+17**

[1] Inexplicable shift of opinion from Very Desirable to Of Little or No Importance. See p. 76.

*Refers to Time
**Refers to Desirability